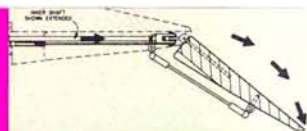


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NEWS



ON THE COVER: A Bob Violett Models demo F-16 Falcon makes an approach at the 1991 Mid-Atlantic Fan Fly. Photo by Tony Nunez.

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EDITORIAL

T O M A T W O O D

COMPETITION FUN-FLY UPDATE

It was my pleasure, at the Toledo show, to attend a meeting held by a pioneering group of R/C pilots dedicated to that adrenaline-producing sport known alternately as "competition fun flying" and "fun-fly competition." As a result of this meeting, a new organization has been born—the National Competition Fun-Fly Association (NCFFA). The planes used in fun-fly competition are slow-flying yet

for their efficiency as air brakes, elevator-flap coupling and ultra-light construction, these new designs also show practical solutions to some of the age-old questions regarding the slowest practicable flight. This is fertile ground for the designer, too, not just the sportsman.

At any rate, the new association's first order of business was to ensure continuation of the Competition Fun-Fly Nats, an event notably sponsored in recent years by *R/C Report* (under the guidance of Gordon Banks and with the support of local clubs and a slew of national contributing sponsors). Since *R/C Report* has withdrawn from sponsoring the event this year, *Model Airplane News* and the NCFFA are jointly sponsoring the 1992 Summer National Competition Fun-Fly, to be held on September 5 and 6 in Nashville, TN. We will provide full coverage.

For more information on this year's event, contact Roy Pinner, NCFFA president, at (407) 778-0770. You can join the association for \$10 a year, which covers the cost of producing and mailing its newsletter.

NEW SOARING COLUMN

We'd like to thank John Lupperger for his years of service as a contributing writer on gliders and electrics in our "Quiet Flight" column, which has now been phased out. Although we recognize that John has many followers, we believe it's time for a change in format. Rather than treat two subjects in a single column, we're instituting a new soaring column—"Center on Lift," by Michael Lachowski. For the near term, we'll offer feature articles about electric flight by qualified writers.

Michael Lachowski has been flying R/C for 18 years. His first airplane was a scratch-built glider with a power pod, and his main interests through the years have been sailplanes, old-timers and electrics. Michael is the editor of the Eastern Soaring League's newsletter and is active on the competition circuit (in 1991, he finished second to Josh Glaab in the ESL season standings, Expert Class). He has

completed LSF Level IV and has Level V contest wins.

Michael brings to the topic of soaring a strong interest in design, practical experience with composite construction, and degrees in mechanical engineering and computer science. A systems engineer at a major petrochemical company, Michael also finds time to teach at a local college and serve as secretary for the Round Valley R/C Club in New Jersey. We look forward to Michael bringing to his column the best technical ideas for both competition and sport flying. If you'd like to ask him questions, or make suggestions for his column, contact him c/o *Model Airplane News*, 251 Danbury Rd., Wilton, CT 06897.

INTERNATIONAL GOODWILL FLIGHT DELAYED

Yogendra Jahagirdar has indicated that because of a shortage of time, it hasn't been possible for him to complete the immense amount of planning and scouting required to fully prepare for the U.S. leg of his transcontinental goodwill R/C flight (see "Air Scoop," April '92, and "Airwaves," May '92). Yogi has delayed his global flight for at least a year so that he can revise his U.S. itinerary, coordinate with local R/C clubs and make the necessary contacts with local authorities. Yogi is still seeking volunteers who can serve as "nerve centers" for U.S. planning. If you'd like to get involved, you can contact Yogi at: Transworld Flight Event Secretariat, 106/5 Erandwane, Ketkar Rd., Pune, 411-004, India. Office phone: 011-91-212-334757; fax: 011-91-212-792574; residence: 011-91-212-438678.

TOLEDO BRIEF

This year's Toledo show seemed to be a milestone. Held at the Seagate Center, it was as comfortable and well-organized as any major trade show. The Weak Signals R/C Club of Toledo again deserve thanks for doing an outstanding job. We plan to bring you updates and reviews of the most interesting products we saw at Toledo.



Mark Heining (left) of Proctor Enterprises and Editor-in-Chief Tom Atwood talk about Proctor's impressive new Albatros DVa kit at the 38th Annual Radio Control Exposition held in Toledo, April 3 to 5. Proctor has acquired the VK Model Aircraft line, and they also introduced an impressive new line of radial engines at the show (see "Air Scoop").

extremely aerobatic aircraft (one of many designs in this class is the Tadpole, published in our January 1991 issue). Contestants, who compete against the clock, must perform a series of precision aerobatic maneuvers in as short a time period as possible.

Like many before me, I can attest that flying a fun-fly competition airplane makes for instantaneous fun. Although I would only qualify to compete in the novice class at this point, the bug has bitten me hard. Imagine a plane that glides more slowly than a Gentle Lady, yet is so agile that an intermediate pilot can easily perform a series of Cuban-8s in a 30-foot-square box! These planes are so light, some are capable of being spun to a touch-down and then, on the rebound, flying to the next maneuver. With props selected

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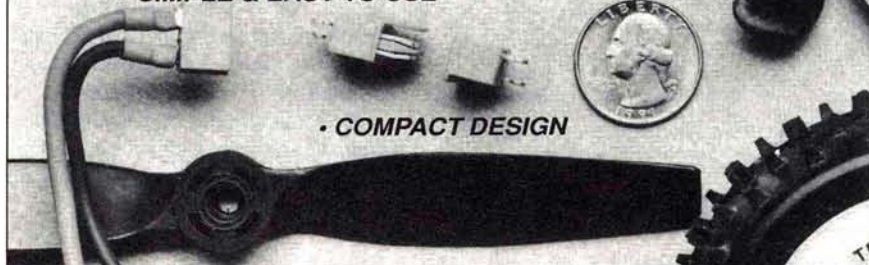
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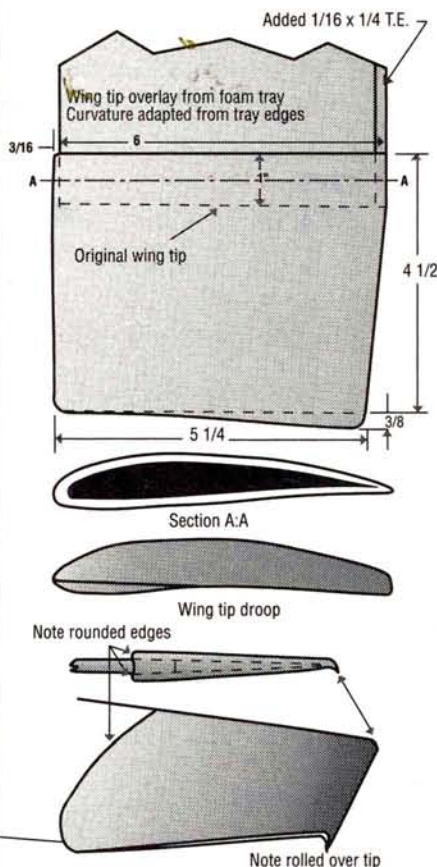
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AIRWAVES

WRITE TO US! We welcome your comments and suggestions. Letters should be addressed to "Airwaves," Model Airplane News, 251 Danbury Road, Wilton, CT 06897. Letters may be edited for clarity and brevity. We regret that, owing to the tremendous numbers of letters we receive, we cannot respond to every one.



WING-TIP TIP?

I found that wing tips made of thin Styrofoam (as shown in the illustration) significantly enhanced the flight performance of a model I flew recently. I'm throwing this idea out for comment and further testing.

These wing tips were grafted onto the wings of a 40-ounce electric, and they caused marked improvement in climb and slow-flight performance. The tendency for the wing to drop out of a slow turn was greatly reduced. Flight times appeared to be longer, and the plane's minimum glide speed was slower.

The basic wing is from a Cox Eagle II sailplane kit. I added a balsa trailing edge and covered the wing with medium-weight silkspan that had been soaked in a 50:50 mixture of water and Elmer's glue to stiffen it and harden the surface. I painted the wing with Red Devil water-based latex.

The wing tips add 42 square inches to the original 372-square-inch wing area; this reduces wing loading from 15 to 14 ounces

per square foot. Seven 800mAh cells power a Mabuchi 540 motor that spins a Master Airscrew 9x5 prop. The wing tip provides a thicker section than the wing proper, and theoretically keeps flying after the thinner inboard section stalls.

I think that the rounded bulge above the wing surface retains the airflow at a lower air speed than the normal tip. It's rounded instead of squared off like the NASA Safe Wing (see Andy Lennon's article in the June '90 Model Airplane News), and I theorize that the spanwise movement of the slipstream tends to follow this surface instead of breaking. The sharply downturned vortex-smoother tip is similar to an add-on kit that was popular for Cessna wings that reportedly made a noticeable improvement.

I'd be interested to see if any readers would care to comment on this design or to further test it to confirm or qualify its value.

ROY CLOUGH
Pittsfield, NH

Roy, I bet that several readers will have a quick response regarding the utility of these tips, and we'll publish responses that shed light on what may be going on here. Any readers care to take up the challenge? Please send us your comments, and write "Wing Tips" on the envelope. TA



HALIFAX UNCOVERED

In the interests of technical and historical accuracy, I'd like to correct what I regard as a gross error in the December '91 "Fifty Years Ago" column. It's unfortunate that the material that was lifted was erroneous. This piece first appeared in 1941 during a

period when Britain was embroiled in the night offensive against German industry, and it's quite possible that the information released on this new heavy bomber was deliberately misleading in the interest of security.

The Halifax wasn't built with steel tubes, wooden formers and fabric covering. It was built in the same manner as the U.S.-built B-24s and B-17s—aluminum ribs, frames and stringers covered with aluminum-stressed skin. In fact, some of the construction features of the Halifax hadn't then been attempted in U.S. aircraft.

As with all British bombers, the defensive armament wasn't as good as it could have been. The Halifax bombers used the readily available .303 rifle-caliber machine guns, instead of the heavier .50-caliber guns available to American aircraft. Despite this shortcoming, the Halifax bore the brunt of RAF Bomber Command's night offensive and took part in greater numbers than Avro's Lancaster and the Stirling, built by Short. It seems unfortunate that the Lancaster received most of the accolades, leaving the poor "Halibag" the Cinderella. The reputation of the Hurricane, which served alongside the much more glamorous Spitfire during the Battle of Britain, suffered a similar fate.

The Handley Page Halifax also earned the distinction of being the only British heavy bomber capable of serving in the Middle East and Far East theaters, as it was easier to modify for the hot, humid climates in those areas. In addition, the Halifax also served as a maritime patrol craft and antisubmarine bomber, a supply dropper, a troop transport, a mine layer and a glider tug. Later, when "up-rated" engines and better armament could be fitted, this remarkable machine made regular long-range runs to Yugoslavia, where it dropped supplies to the Resistance fighters. Not a bad record, all told!

After attacking the German battleship Tirpitz, a Halifax was forced to land on a frozen lake in Norway. It sank in 90 feet of water, and it was recovered in 1973. It's displayed on a bed of sand and gravel, in the condition in which it was raised from Lake Hoklingen—an emo-

(Continued on page 10)

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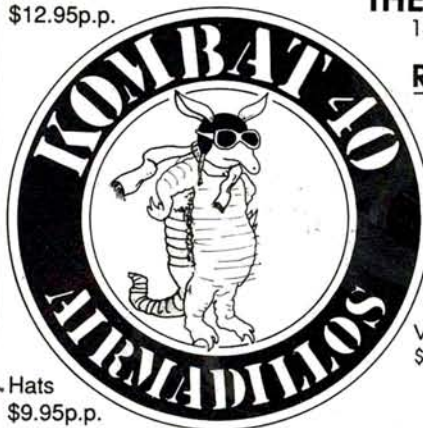
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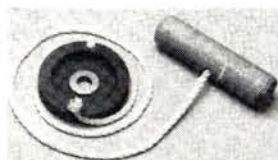
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AIRWAVES

tional sight to behold, and a fitting memorial to all those brave RAF crews who flew Halifax missions in some horrendous conditions.

Of the three types of British heavy bomber that were built, the Halifax production was 40 percent of the total. At the end of WW II, it was agonizing for me to watch these planes being cut up for scrap. Today, only one Halifax survives, and it's in the Royal Air Force Museum, in Hendon, England.

JIM NEWMAN
Hobart, IN

Our apologies for picking up inaccurate information from a wartime issue of Model Airplane News, and thanks to Jim for setting the record straight. Readers will recognize him as the author of our popular "Hints and Kinks" column, a book on control systems and other works published by Air Age. Jim lived in the London area during the war, and he later served in the RAF. He has a reputation for keeping the editors at Model Airplane News on their toes. TA

WHAT'S DOCUMENTATION?

A while ago, I purchased an informative issue of your magazine (February '92). I didn't notice it at the time, but my name appeared in your "Airwaves." Thank you all! The information you gave me really helped. I'm late getting back to you because I'm building my first plane, a Freedom 20. I really loved the three-view of the Curtiss P-40F. It's inspiring. This brings me to my question: what are the requirements for scale documentation? I keep hearing that good documentation helps, but what's required and what isn't?

PHIL WARD
Highgate, Ontario, Canada

Phil, for this one we went to the master himself—our "Sporty Scale" columnist Frank Tiano. This is what he had to say: "There are three components in a good scale documentation package. First, get a three-view line drawing of the general aircraft type you've modeled. The line drawing should match your model's front view, side view and top/bottom

(Continued on page 93)

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AIR SCOOP

CHRIS CHIANELLI



This year's Toledo Show was the best ever, in my humble opinion (which, history shows, is always right)—a well-run event, and a totally pleasurable convention site in which to conduct one's spy work! Here are some of the highlights.

Flying Futaba

Is Ron Hieb, director of sales and marketing at Futaba's Hobby Division, cheerfully catching this prototype Futaba radio, or is he throwing it up in the air to celebrate its projected September release? We may never know—or care. The important thing is that this radio—I'll refer to it as the "Z-series" for now—is full of innovative features too numerous to mention here. The new system *does* have an expanded flight condition capability, so a flip of a switch will give you a selection of five programmed parameters. For example, glider fliers can set conditions for normal, start, speed, distance and landing. All the control parameters can be tailored to the pilot's liking. The new system also has AFR (one to eight channels, two rates per channel per flight condition) and VTR/EXP (one to eight channels, two rates per channel per flight condition). The models that will be available in September are the 9ZAP and the 9ZHP (heli). Rumor has it that a version that can synthesize your frequency of choice will follow.



Some say that the Germans had Stealth technology in the '40s, but who knows? What's really worth discussing is this 62-inch-span model of the Horten IX V2b created by Keith (the-master-of-electric-models-that-really-move-out) Shaw of Ann Arbor, MI. This 88-ounce model has a wing loading of 17 ounces per square foot and handmade rotor-fan parts. After five years of testing, the Astro Cobalt .05-powered fan units generate 22 ounces of thrust at 28,000rpm. Calculations indicate that speeds of 100mph are within the reach of this design.



**STEALTH
IN '44**

YOUR BUDDY IN A BOX

Now you can have a full-time caller at your pattern practicing sessions, and he'll never ask you to share your sandwich or your cigarettes. With the new Ultra Commander voice sequencer, you can record your own pattern



sequence on this 100-percent, solid-state, 9V unit. You receive the commands through the included ear plug when you press the playback or remote playback button. The 2x4-inch unit weighs only 5 ounces, comes with a belt/pocket clip and costs \$64.95. For more information, contact Ultra Products, 5455 Linger Longer Rd., Cummings, GA 30130; (404) 889-4758.

The name "Kyosho Concept 10" may belie the true nature of this muscular little acrobat; it's powered by a recoil-started O.S. Max CZ-HX .15 ABC, not a .10-size

**WHEN
10=15**

engine! I wonder why they did that? Half of the parts on the 80-percent assembled Concept 10 are compatible with the electric-powered EP Concept. According to Great Planes, this little chopper performs loops, rolls, 540-degree stall-turns and other aerobatic feats right out of the box.

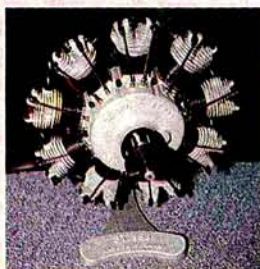


AIR SCOOP



Success Breeds Sukhoi

Midwest Products has had such success with their easy-to-build, easy-to-fly "fun-scale"-type models that it's great to see them add this new .40- to .46-size version of the famous Russian Sukhoi aerobatic plane. It has the same all-wood, high-quality construction and excellent parts fit that has made the rest of the series so popular with sport modelers. Watch for it.



IT'S ROUND AND IT RUNS

Proctor now imports these beautifully made German 4-stroke radials in five-, seven- and nine- (shown) cylinder configurations. Not only do these works of art look incredibly good, but they're also reputed to out-perform other radials. For more information, contact Proctor Enterprises, 25450 NE Eilers Rd., Aurora, OR 97002; (503) 678-1300.

TALKING TELEMETRY

Adaptive Engineering's R/C Talker is a speech-based micro-telemetric package for R/C aircraft. The R/C Talker's female voice gives real-time data on engine rpm, air speed, altitude and vertical acceleration. You can adjust the four channels that carry the information so that you can hear the info that's important to you. For example, you can have the altitude reported once each minute and the air speed reported every 3 seconds; you can even completely disable the channels. The only thing that Madame Telemetry won't divulge is when to "pull-up," but who knows what the future will tell us. For more information, contact Adaptive Engineering, P.O. Box 1691, San Bruno, CA; (415) 871-7744.



This 17-inch-span Micro Shark from J&M Glascraft has a total flying weight of 4.5 to 5.5 ounces and is specifically designed for Cox T.D. .010 and 2-channel micro radios. The deluxe kit includes a fiberglass fuselage with a firewall installed, all wooden parts and hardware, full-size rolled plans and wheel pants. Kit should be available by the time you read this. For more information, contact J&M Glascraft, 30820 Mayflower, Roseville, MI, 48066.



5 oz.
SHARK
ATTACK

Lately, Robbe Model Sport has spent a good amount of time targeting the American market; this new "fun-fly" competition design, called the "Do It," is proof that Robbe's aim is damn good! The all-balsa Do It has a pro-



DO IT ROBBE!

jected weight of 3.25 to 3.75 pounds and requires a .28 to .40 2-stroke engine. Do It should be available by the time you read this. For more information, contact Robbe Model Sport Inc., 180 Township Line Rd., Belle Mead, NJ 08502; (908) 359-2115.

HINTS & KINKS

J I M N E W M A N



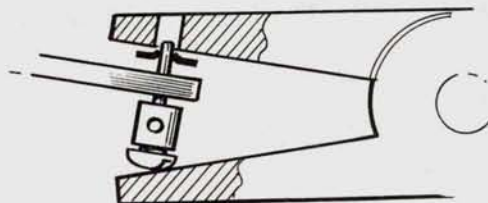
Model Airplane News will give a free one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Hints & Kinks." Send a rough sketch to Jim Newman c/o Model Airplane News, 251 Danbury Rd., Wilton, Ct 06897. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO, AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we can't acknowledge each one, nor can we return unused material.



NUT STARTER

Place a piece of tape across the flat part of your wrench, press the nut into it, then start the nut onto the screw. This is especially helpful when the top of the screw is obstructed, e.g., by the exhaust stack.

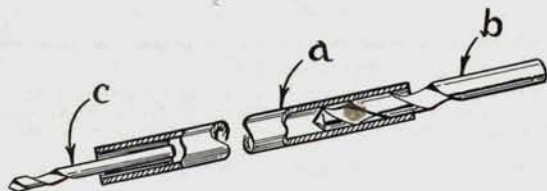
Dennis Bryant, Burgess Hill, W. Sussex, England



SPRING RETAINER APPLICATOR

Drill a hole through the upper jaw of an inexpensive pair of duck-billed pliers. Used as shown, they make it easy to press spring retainers into place.

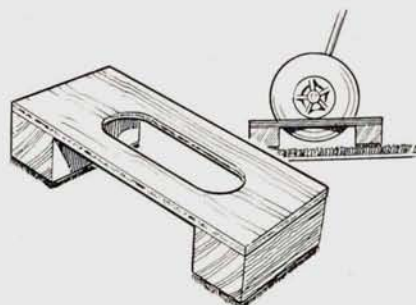
Bill Mitch, Hebron, IN



MINUTE EXTENSION DRILL

Jam a tight-fitting drill bit (b) into the top of a piece of outer Nyrod (a). Select the bit size required for the job (c), wrap it with masking tape and force it into the other end of the Nyrod, then glue it in place with CA. The tube can be any length because you "steer" it into place by hand. (Use a variable-speed drill at lowest speeds only.) It's useful for drilling those awkward holes for pushrods, etc. After you've finished using it, dunk the assembly in acetone to disassemble it.

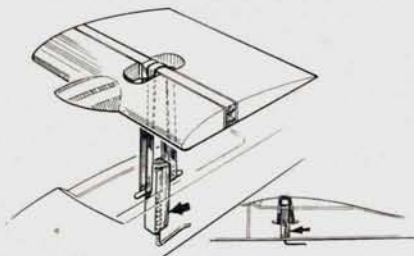
Bill Watson, Hendersonville, TN



TRUCK-BED WHEEL CHOCKS

The secret behind these scrap-wood chocks is the hook side of the Velcro® that's glued to the bottom. This snags the carpeting and stops the model from sliding around en route to the field.

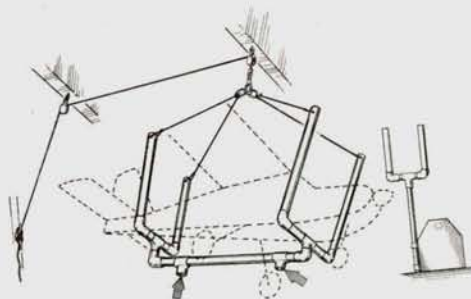
Michael Van Zuidam, South Holland, IL



TOW-HOOK LOAD TRANSFER

Glue a piece of hardwood, e.g., maple stock, between the floor and the wing of your glider. Screw the hook into the bottom of the block. A cross-bar engages the rubber bands that go over the main spar, and the towing load is transferred directly to the wing spar instead of tearing the bottom out of the fuselage. You can put fiberglass tubes for the bands through the wings, but they're not necessary. You can use plug-in hatches to seal most of the holes, too. If you prefer the convenience and shock-absorbing quality of bands, this is a much neater solution.

Margus Viilup, Tartu, Estonia



SUSPENDED MODELS

This cradle is made of PVC plumbing pipe and fittings that have been joined with regular pipe cement. Note the forward slope of the front verticals. This is to clear the wing—especially on cabin models and biplanes. With such a system, you can store the fully-rigged model until your next flying session; with an overhead power supply, it can be charged while hanging, too. Caution: inspect the inside of the plane regularly for loose servo screws, connections, etc. Use the threaded pipe connections on the bottom to attach legs; you can clip the cradle to the side of your field box and use it as a work cradle at the field. (Don't use it for engine running, and make sure that you put foam rubber around the spanwise tubes.)

Don Kelton, Palm Beach Gardens, FL



.60-size Texaco Special



LOCKHEED VEGA

AIR EXPRESS



WHEN LOCKHEED introduced its all-wood Vega in 1927, it featured a fully enclosed cockpit forward of the five-place passenger bay. Western Air Express placed an order for eight, but specified that Lockheed build them with an open cockpit and a parasol wing. It seems that the WAE pilots were too smart to be trapped inside a warm, cozy cockpit, and having spent my entire life as a pilot, I fully understand. I remember veteran pilots who swore they'd never give up the recs for jets and some who even refused to turn on the weather radar when it became required equipment in the late 1960s.

by PETE FUSCO

Western Air Express took delivery of only one aircraft, and the rest became available to do what they seemed destined to do from the start: set records. More powerful and faster than the Vegas, the Air Expresses were soon in the hands of the most famous airman of the day, Roscoe Turner. He and his pet lion, Gilmore, flew one in the striking cream, red and gold colors of the Gilmore Oil Co. Mine is the famous "Texaco 5," as flown by Captain Frank Hawks. Hawks set many long-distance records with this ship, but I think most remarkable was his Philadelphia to New York time of 20 minutes in 1929. Twenty minutes would be a good time today in a Boeing 727!

Blame the model version on my buddy Jim Bliss, who has more enthusiasm for this hobby than anyone I know. I mentioned to Jim that if I could find a three-view of the Lockheed Air Express, I'd build a .60-size version for R/C. Jim searched through his voluminous files and mailed me a 1-pound packet of pics and drawings. He had called my bluff. I began to cut wood.

CONSTRUCTION

Before I begin the construction notes, let me tantalize dedicated scratch-builders by pointing out that Lockheed used the same basic plywood fuselage, wing and tail for the cabin Vegas, parasol Air Expresses and low-wing Sirius, Altairs and Explorers. The same could be done with these plans.

● **Wing.** Building one panel at a time, fit the wing ribs to the two bottom spars. (Don't worry about cutting the top spar notches at this time.) Pin the inboard ends of the spars to your work surface, and block up their outboard ends until the top of rib R-9 is the same height as the top of R-1, which should be resting on the work surface. Square all ribs to the surface and then glue them to the spar. The result will be a wing with a flat top and dihedral on the bottom. This is the scale configuration.

Glue the wing halves and the front and rear dihedral braces to-

gether. The rear brace will have to be cut through about halfway and bent forward slightly. Add the wing tips. Find two pieces of straight 36x4x³/₃₂-inch balsa, and glue them to the bottom of the

* * *

"..let me tantalize dedicated scratch-builders by pointing out that Lockheed used the same basic plywood fuselage, wing and tail for the cabin Vegas, parasol Air Expresses and low-wing Sirius, Altairs and Explorers."

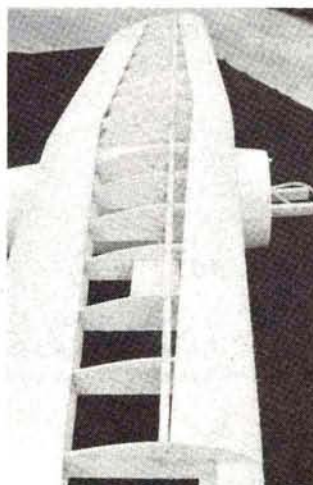
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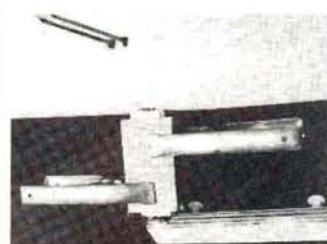
Author's daughter, Amy, shows off the Air Express in front of a 1934 Ford five-window coupe.

trailing edge, leaving a ⁷/₈-inch overhang on which you'll now glue the ¹/₂-inch-wide trailing edge. Ready-made trailing-edge stock won't fit the airfoil shape, so you'll have to sand a piece of ¹/₂x¹/₄-inch balsa stock to fit. Bend

the end of the sheeting so that it conforms to the wing tip and glue it to the tip. Note: except for the upper front of the wing tip, which requires a shaped block, the sheeting can be coaxed over R-9 and glued to the wing tip with instant



Mark its position, notch it and install the top spar after the top and bottom leading- and trailing-edge sheeting has been applied (makes for a perfect fit).



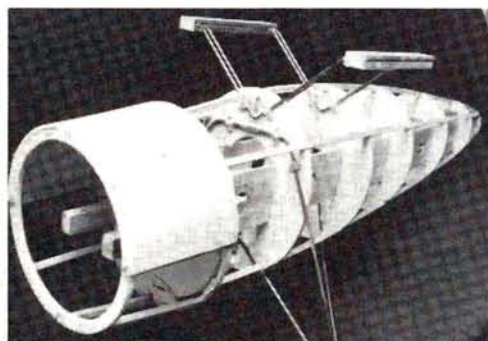
Cabane strut is sandwiched with balsa and clamped until dry before being carved and sanded to an airfoil shape.

Type: Sport-scale parasol
Wingspan: 61 inches
Wing area: 629 square inches
Length: 40.5 inches
Power req'd: .60 2-stroke or .90 4-stroke
No. of channels req'd: 4 (rudder, elevator, aileron, throttle)
Weight: 7.5 pounds
Wing loading: Approximately 27.5 ounces per square foot
Wing incidence: 2 degrees positive
Stab incidence: 0 degrees

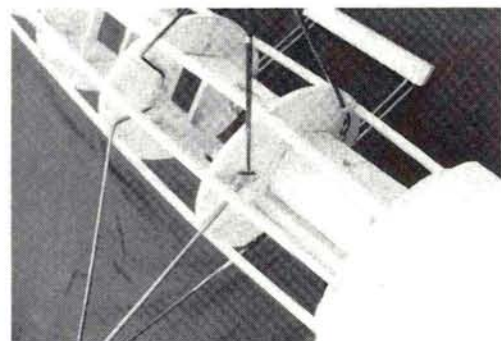
SPECIFICATIONS

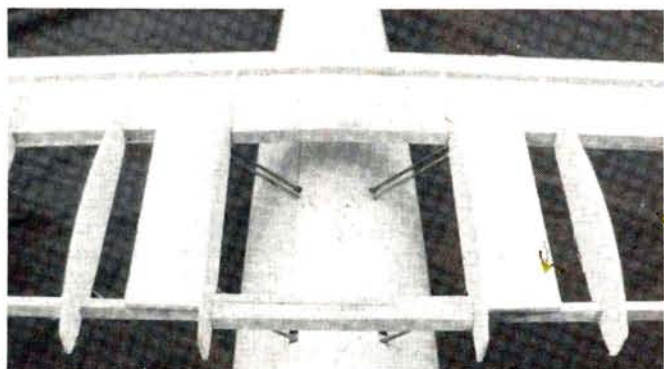
glue (kicker helps). Epoxy the ¹/₄-inch plywood cabane attachment pieces to the top of the bottom spars, and "snug" them against the outside of R-2. Don't drill the ¹/₄x20 bolt holes yet.

Mount the control rods and

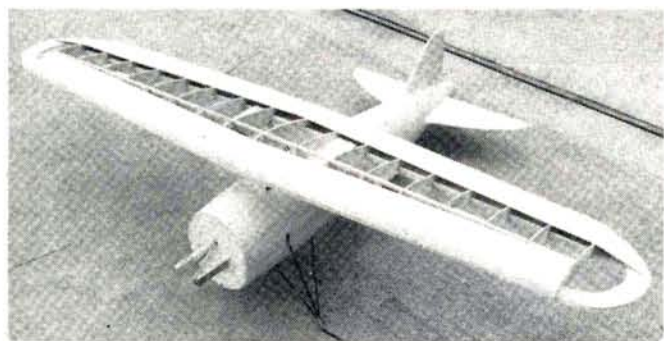


■ *Left: fuselage box crutch with formers and stringers installed. Cowl as shown has been partially sheeted. ■ Right: view of fuselage bottom showing gear details. Note the brass fitting that holds the front bottom gear legs in place and allows a little bounce.*





The wing after it has been fitted to the cabanes. It has been drilled and is held in place by four 1/4-20 nylon bolts.

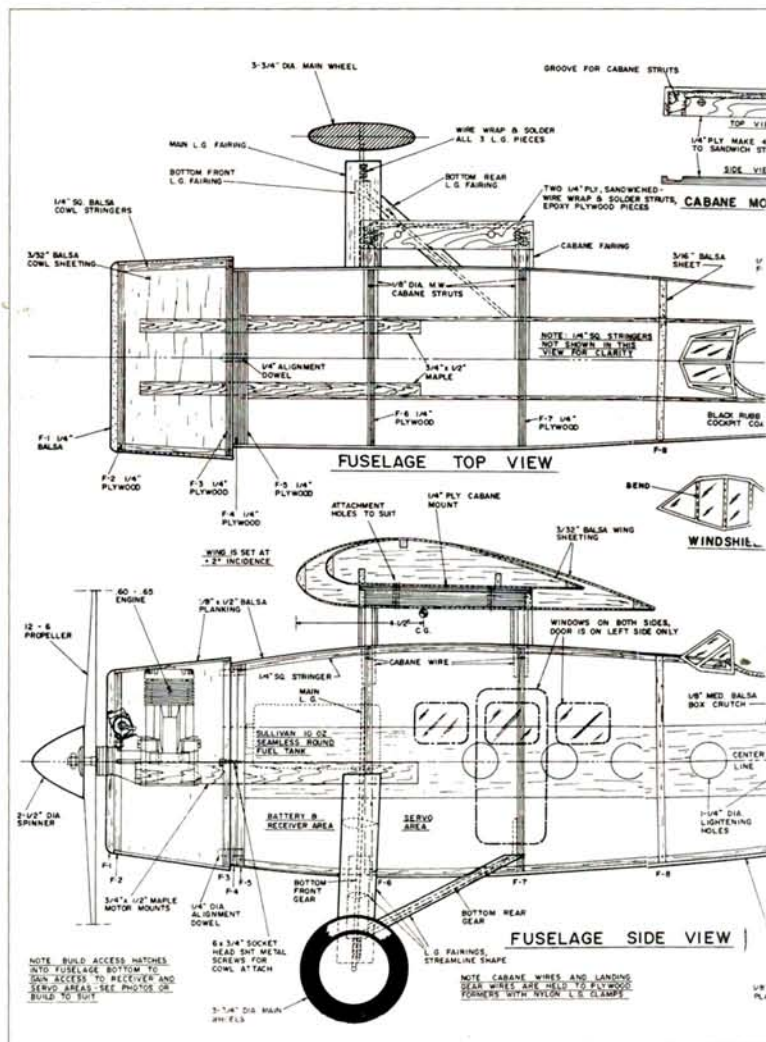


The fully planked fuselage is shown with the wing attached. The wing-tip blocks have yet to be installed before the final sheeting.

servo in the wing center section. I like bellcranks, as long as everything is secure and play is kept to a minimum. The use of swivel ball links on the rods going from the bellcranks to the ailerons will allow the flexibility you'll need when it's time to attach the linkage to the ailerons. The wing should now be set aside. The leading edge, the top spar and the

remaining sheeting will be attached after the wing has been fitted to the cabane mounts.

● **Fuselage.** Cut out all the fuselage formers but don't notch them for the stringers. Bend the four cabane wires and mount them on the front and back of formers F-6 and F-7 using nylon landing-gear mounts. Bend the main landing gear and attach it to the front of



MATERIALS

- 4 sheets 36x4x3/32-inch—wing sheeting
- 8 sheets 36x3x3/32-inch—wing and tail sheeting and wing ribs
- 3 sheets 36x4x1/8-inch—fuselage planking and fuselage crutch
- 4 sheets 36x4x1/4-inch—fuselage formers and wing tips
- 2 sheets 36x3x3/8-inch—tail surface framing
- 2 sheets 36x3x3/16-inch—fuselage formers
- Soft blocks—wing tips, headrest and tail cone
- 4 pieces 36x1/4x1/2-inch—spruce or hard-balsa bottom wing spars
- 8 pieces 36x1/4x1/4-inch—stringers and top spar
- 2 pieces 36x1x1/2-inch—leading edge
- 1 piece 24x12x1/4-inch—five-ply plywood for formers and cabane mounts, etc.
- 5 pieces 36x3/32-inch music wire
- 5 pieces 36x1/8-inch music wire
- 1 piece 36x3/32-inch music wire

(All balsa unless otherwise noted)

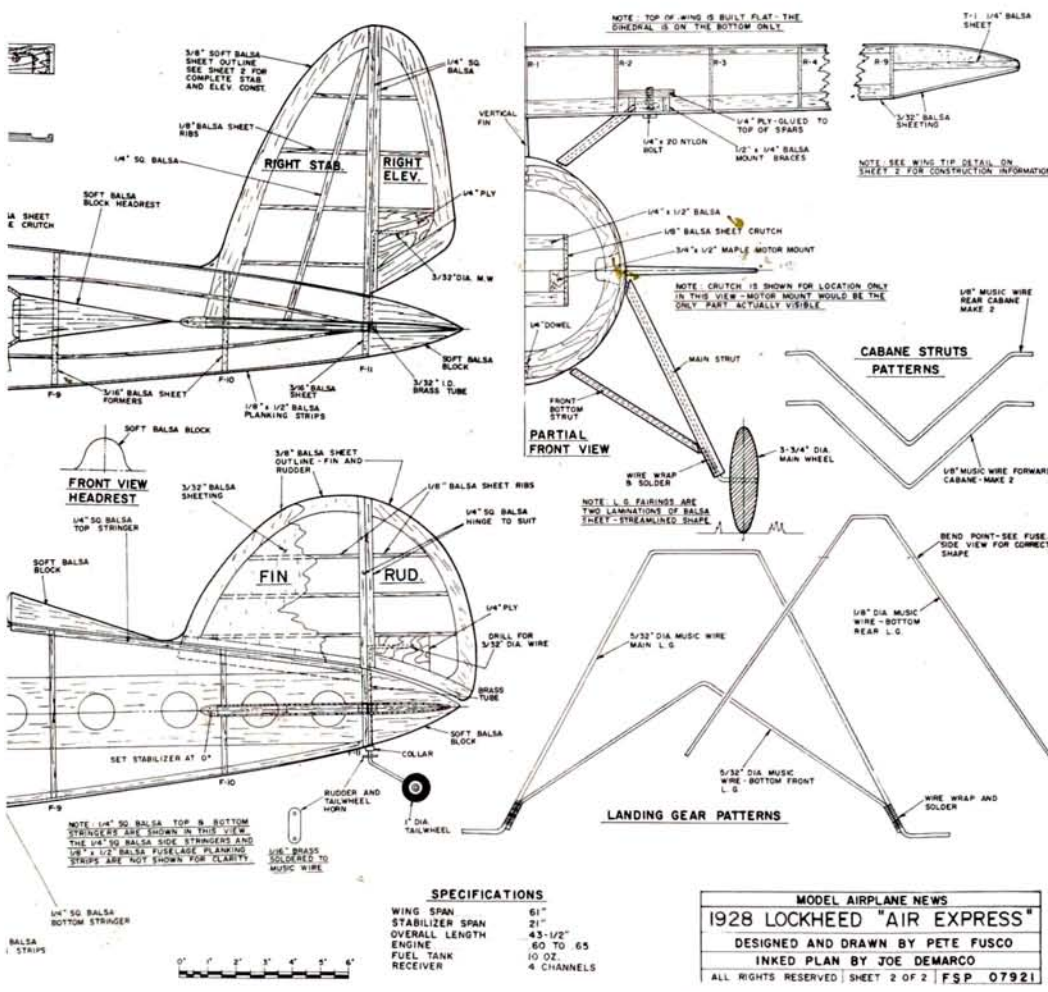
F-6—again, using nylon gear mounts. Build the box crutch and attach all the formers to it. You can use maple beam mounts, as I did, or you can install a radial engine mount on the firewall.

Bend and attach the front and rear bottom landing-gear wires at this time. It's not as hard as it sounds. The idea is to make all three ends on each side meet. Wrap the pieces with thin copper wire, and solder them. (Remember, when you use any kind of silver solder, you don't apply heat to the solder joint directly.) While holding the solder on the joint, heat the wires with a propane torch, keeping the flame an inch or two from the joint. The solder will flow beautifully when the heat is right. The front bottom gear piece rides up and down in a brass slide, as shown. This gives the gear a little bounce.

Fit the wire "U" into the cabane

wires as shown, wrap with wire and solder to the cabane uprights. Cut out the four plywood cabane mounts, groove them to accept the wires and epoxy the pieces together in a sandwich, holding the assembly in strong clamps until the epoxy has dried. Drill the four 1/4-20 bolt holes in the finished cabane mounts. (At this point in the construction, it occurred to me that the difficulty of building the cabanes is why the Air Express has been bypassed by many scale model builders.)

● **Back to the wing.** The wing should slip over the plywood cabane mounts at this point, although it will probably take a little fitting and bending. When everything is lined up, clamp the wing to the plywood cabane mounts at the plywood cabane attachment points, and drill from the bottom up through the pre-drilled holes in the cabanes.



Add the wing leading edge, which is tapered and beveled with a coarse sanding block after it has been attached. Glue on the top trailing-edge sheeting and the top and bottom leading-edge sheeting. Lay a straightedge along the top of the wing, and mark the

position of the top spar. Notch and install the 1/4-inch-square hard-balsa top spar.

Finish sheeting the wing, making sure you don't sheet over the cabane-mount locations on the bottom of it. Support the bottom sheeting in the wing around the

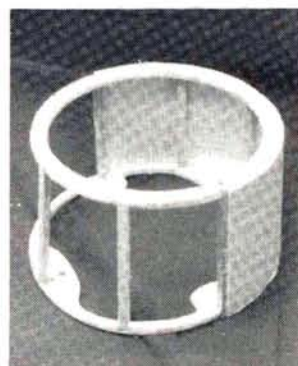
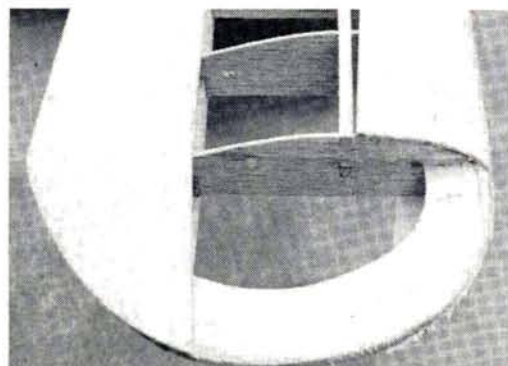
cabane mounts with some scrap 1/8-inch-thick sheet. Cut the ailerons out of the wing, bevel them on the bottom (according to the plans) and use balsa stock to fill the openings made in the wing and the ailerons. Trial-fitting is the only way to go on this, but the

result will be ailerons that look as if they've been cut right out of the wings—which, of course, they were. Remember to install a small piece of plywood inside the aileron for a horn mount.

● **Finishing the fuselage.** Using the positions of the stringer notches on the formers as guides, hold a long piece of 1/4-inch-square balsa in place against the formers, and mark the exact positions of the stringers. Notch the formers and install the stringers. After installing the tank, plank the fuselage—except for the bottom, which should be left open to allow the installation of the control rods and the servo mounts.

Build the cowl and fit it onto the front of F-4, using the two alignment dowels and two socket-head sheet-metal screws. Making the cowl is simply a matter of joining F-2 and F-3 with four pieces of 1/4-inch-square hard balsa in the notches and four more between the formers. Bend pieces of 3/32-inch-thick balsa around the cowl, and glue them to the 1/4-inch-square pieces. Now add F-1 and sand the entire assembly. It's great to have the skills to build a cowl like this, because it opens the door to anything with a round engine.

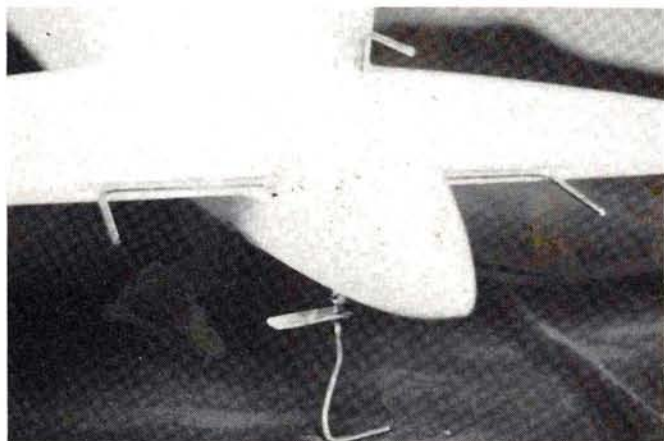
Now that you've mastered round cowls, try your hand at airfoil-shaped struts. I simply glue a piece of balsa that's the same thickness as the wire to the front and back of the wire. (Use a glue like Ambroid because it allows lots of working time and can be



■ Left: a detail of the wing tip before the installation of the top, forward tip. All the other wing sheeting can be coaxied over R-9 and glued to the tip. ■ Middle: the framed tail assemblies before they're sheeted. Note the plywood pieces in the elevators and the bottom of the rudder to accept the 3/32-inch-diameter music wire. ■ Right: half-sheeted cowl. A little ammonia on the outside of the sheet will make it easier to bend. This is a lot easier than making a fiberglass cowl.

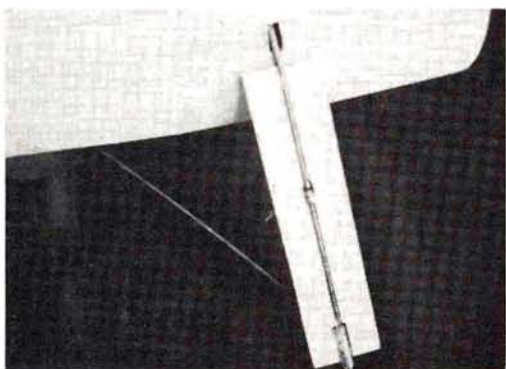
AIR EXPRESS

PHOTOS BY PETE FUSCO



The aft view showing the combined rudder wire and tail wheel with the brass control horn soldered on. Also shown is the elevator wire, which is installed before the tail cone. (All wire is $\frac{3}{32}$ -inch-diameter music wire.)

The main landing-gear strut is shown with the first stage of balsa sandwiching. A top and bottom piece will be added. It will then be carved and sanded to airfoil shape—quick, easy and cheap.



★ ★ ★ ★

"The full-size Lockheed Air Expresses are long gone, so why not build your own and put this colorful, historic aircraft back into the sky. It is, after all, a miracle only our hobby will allow."

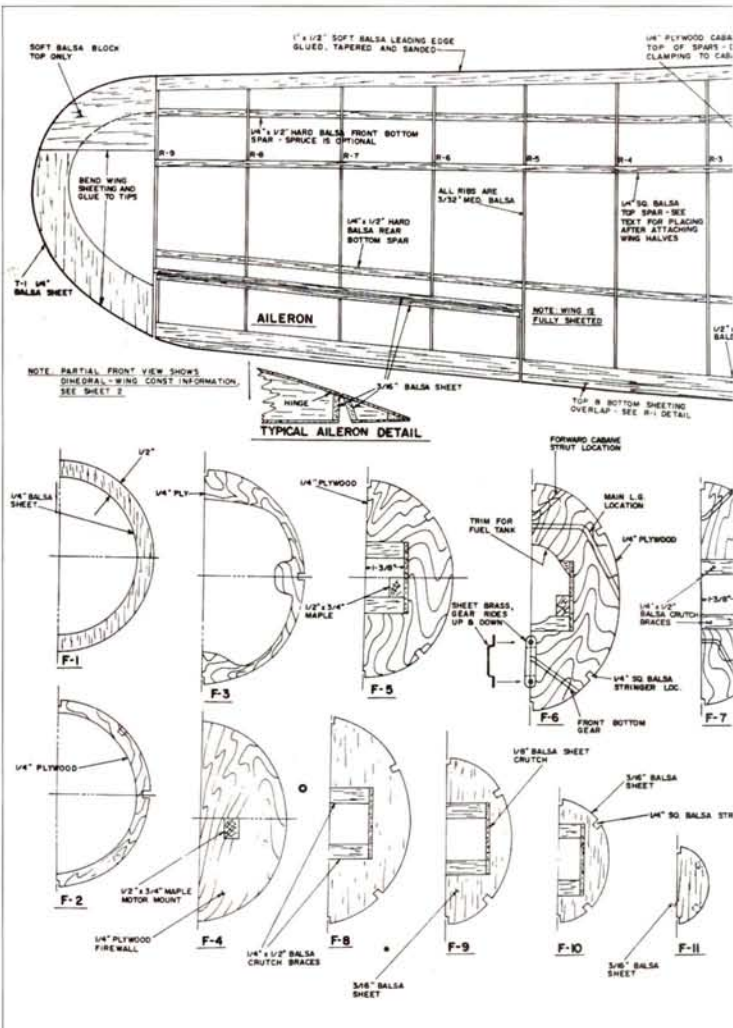
★ ★ ★ ★

sanded easily.) Make a sandwich of the wire and front and rear balsa pieces with two more pieces of balsa—one on each side of the strut. Use lots of glue and clamp it overnight. Carve it roughly to the shape you want, and finish it by sanding. Struts that are prone to twisting on the wire will have to be held in place by soldering small pins onto the wire.

●**Tail group.** Build the tail framework, sand it to shape and cover it with $\frac{3}{32}$ -inch-thick light balsa. In the fuselage, cut out the slot for the stab and glue it into place. The wire that joins the elevators should be installed in its brass-

tube bearing, which is then epoxied to the stab. Slot the fuselage for the vertical fin and install the fin, bracing it with scrap taken from the bottom of the fuselage, which is still open.

Bend the combination rudder and tail-wheel wire, and secure it to the vertical fin in a brass tube. Add the rest of the fuselage planking and the tail cone, and sand everything to shape. To make fillets to go around the stab and the fin, I beveled pieces of $\frac{3}{8}$ -inch-square soft balsa sticks and used a "sandable" wood filler. Now fit the elevators and the rudder, then add the headrest and cut

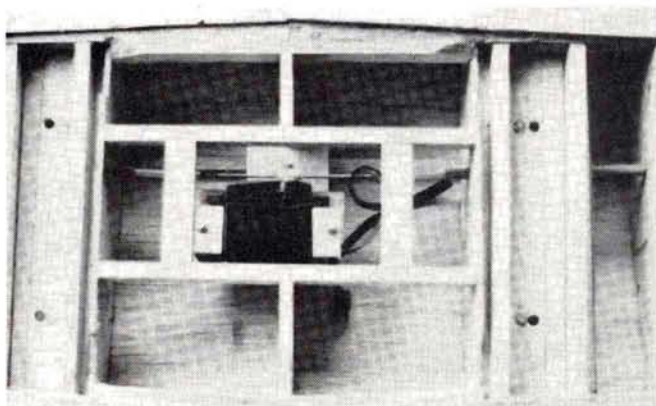


out the cockpit opening.

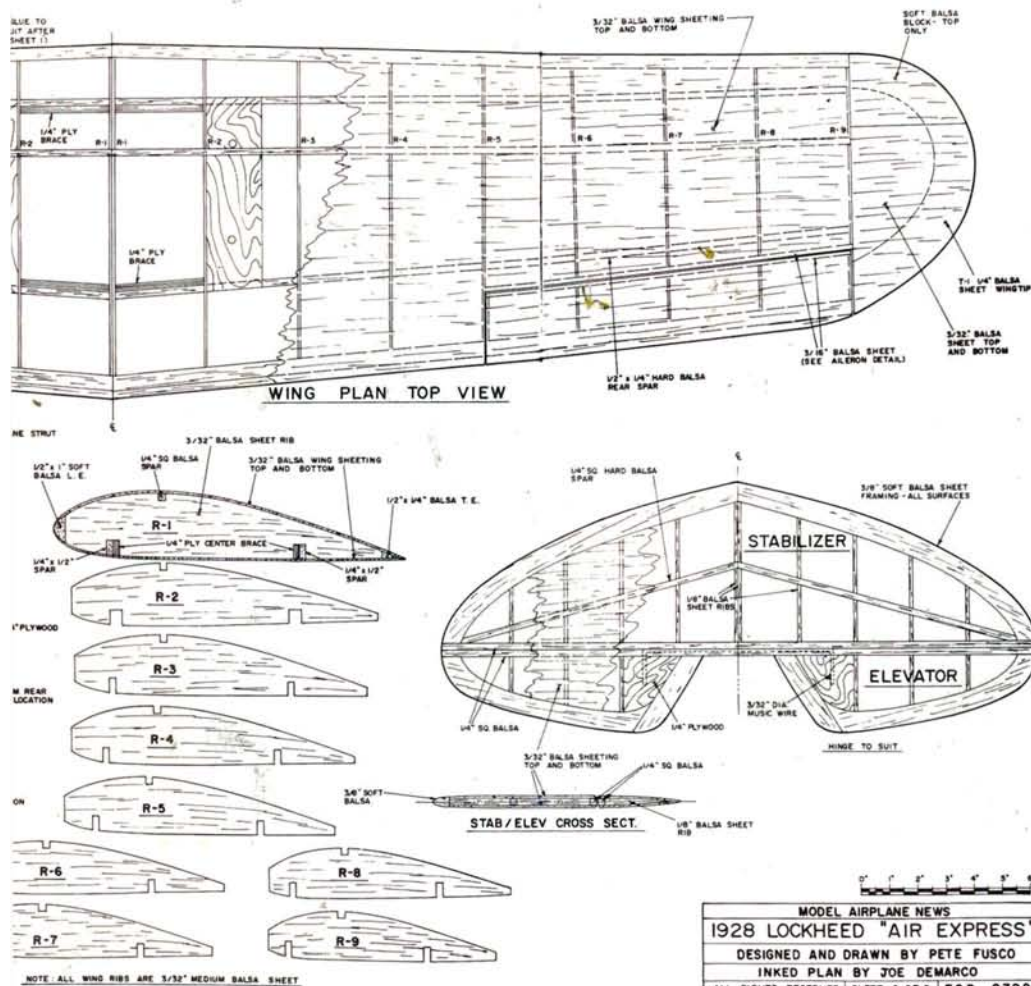
COVERING AND FINISHING

I don't like finished coverings, but I couldn't resist the dark red Permagloss Coverite*, which matches the original Texaco red quite closely.

I covered the bullet-shaped fuselage with five full-length pieces, and the wing, with two. This airplane has sat in the Texas summer sun for hours at a time and hasn't developed a single bubble, so the Permagloss seems to be living up to its manufacturer's ad



The top view of the wing with the aileron servo installed.



claims. Absolutely nothing affects this finish.

Some suggestions: use a pocket thermometer to ensure that you use exactly the temperature Coverite specifies. Also, the adhesive is a light gray, and the color accentuates seams. To mini-

mize this effect, rub the finished seams with a soft rag that has been dipped in Ironex, which you'll also need to keep the iron clean. I followed the directions (unheard of, for me!), and used Coverite's Balsarite on the bare wood. I think it helped.

I use Williams Bros.* scale-type wheels, but I found that they aren't practical for everyday flying. They look good, but are simply too soft for my taste. You might consider a pair of more conventional rubber wheels. During its career, the original aircraft

was operated both with and without wheel pants. Have at it.

For power, I chose a K&B*.65 Sportster, which weighs about 10 ounces more than the typical .60-size engine. The aircraft required only about 1 ounce of nose weight. A 12x6 Master Airscrew* prop turns about 11,400 revs and flies the 7.5-pound Lockheed quite nicely.

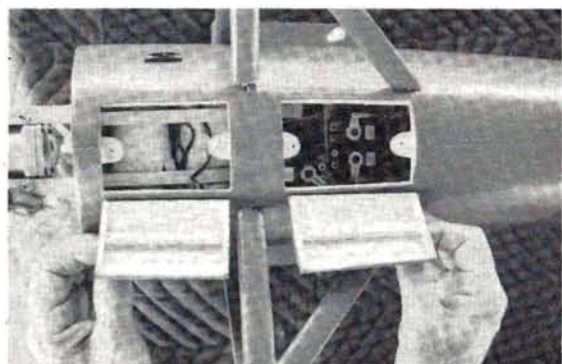
TEST FLIGHT

Test-flying was done by Ray Brickhouse at our Barnstormers Club field in New Waverly, TX. I'm a career intermediate flier and prefer to con others into doing my test-flying. Ray's legendary calmness came in very handy on the third flight, when a loose muffler clamp allowed the engine to shake out of its mounts. It stayed running, but it was held in the airplane by just the cowl. I could only imagine the pitch and yaw changes Ray was fighting. He couldn't kill the motor. When Ray yelled, "Sorry, Pete, but I think I'm going to lose it," I simply turned away and waited for the crash. Incredibly, he managed to land it safely.

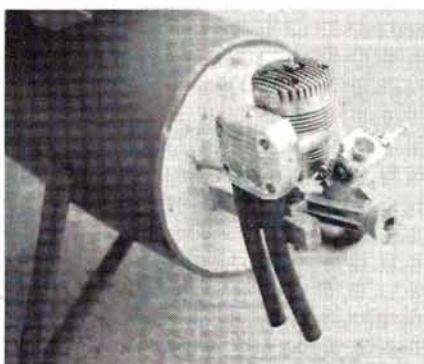
With the motor firmly in place, however, the Air Express is very stable, if just a bit touchy on the pitch because of the somewhat short moments. Roll rate is fast. The ship has no bad stall characteristics—probably because of the thick, nearly scale airfoil. This also adds to its great slow-flying characteristics. Set about 3/8 inch movement on the ailerons, 5/8 inch on the elevator and all the rudder you can get.

The full-size Lockheed Air Expresses are long gone, so why not build your own and put this colorful, historic aircraft back into the sky. It is, after all, a miracle only our hobby will allow.

*Here are the addresses of the companies that are mentioned in this article: Coverite, 420 Babylon Rd., Horsham, PA 19044. Williams Bros., 181 Pawnee St., San Marcos, CA 92069. K&B Mfg. Inc., 2100 College Dr., Lake Havasu City, AZ 86403. Master Airscrew; distributed by Windsor Propeller Co., 3219 Monier Cir., Rancho Cordova, CA 95742.



■ Left: author Pete Fusco loves making hatches. The two on the bottom allow complete access to the radio and the fuel tank. They're held in place with wood screws in plywood tabs, as shown. ■ Right: the engine installation will require the type of muffler shown. The plans show beam mounts, but a radial mount would be simpler to use.



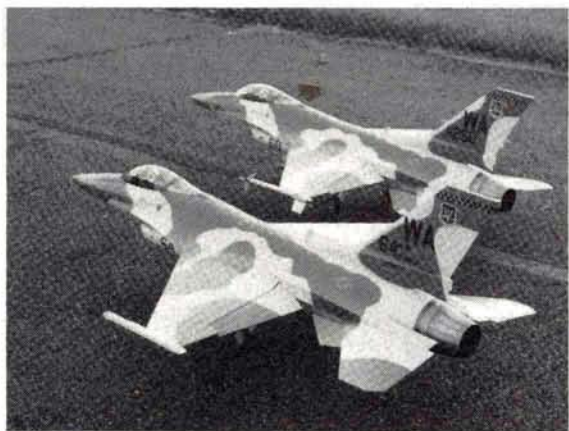
Editor's note: we've used a "group review" approach in this Field & Bench review because we believe it offers a broader perspective that many readers will appreciate. Three writers have contributed to the article. The first, David Malchione, is a Bob Violett Models rep. Why are we using his material? He was able to supply us with a well-organized overview of the product's basic features and on a very timely basis. Yes, he has an interest in promoting the product, but he's known in the ducted-fan fraternity as an individual of high integrity, and you, the reader, can factor all of this in as you read his comments.

Also contributing are two experienced modelers who have no connection to BVM. One is Jess Hogan, an A&P mechanic (27 years with Delta Airlines), a former pattern competitor and a modeler of long experience. This was his first ducted-fan model. Mike Leshner, a police officer who has flown ducted fans since 1984, rounds out the review with an account of his experience building the F-16.

Are we "breaking the rules" with this type of review?—not if it better serves our readers. If you approve or disapprove of this approach, why not write and let us know.

★ ★ ★

GENERAL DYNAMICS calls their full-scale F-16 a "state-of-the-art fighter." In my opinion, this also describes the Bob Violett* F-16—a sophisticated model that has been well-engineered and professionally flight-tested. Its survival of tests such as high-speed, full-power dives and intentional hard landings has proven the durability of this model, and it was for this reason that I first chose to build the BVM F-16.



PHOTOS BY DAVID MALCHIONE

Dave and Tony Malchione's Falcons prepare for a Desert Storm sortie.

THE KIT

Because of the high degree of prefabrication, I was able to build my F-16 in only two weeks. My father also built an F-16, and although he says he doesn't enjoy building, he completed his airframe in just three weeks. This was possible because the instruction package and photo sheets take the guesswork out of this project. (My father and I assembled our kits without deviating from the instructions.)

FUSELAGE

The one-piece, glass, Kevlar-reinforced gelcoated fuselage is gray in color to minimize the paint work. The inlet and the tail pipe are also gelcoated and don't require paint.

SPECIFICATIONS



Model name: F-16 Falcon

Manufacturer: Bob Violett Models

Type: ducted fan

Price: deluxe kit—\$1,200 (includes scale landing gear. Fan, housing engine and pipe not included.)

Wingspan: 46 inches

Wing area: approx. 760 square inches

Wing loading: approx. 37 ounces per square foot

Weight: 12.5 pounds

Length: 67 inches

No. of channels req'd: 5 (aileron, elevator, rudder, throttle, optional flaperons)

Radio used: JR-X347

Motor/engine sizes recommended: BVM .81 - BVM .91

Prop used: Violett Fan

Airfoil type: scale

Wing construction: foam skinned with balsa and reinforced with carbon fiber.

Kit construction: fiberglass and foam, carbon fiber, balsa and ply prefabricated kit with retracts.

Washout built into wing? yes

FEATURES: this plane has an epoxy/glass/Kevlar fuselage, fiberglass molded ducts, factory-sheeted and carbon-fiber-reinforced foam wings, stabs and vertical fin, machined and operating scale landing gear and all the necessary hardware. (Wheels aren't included; use readily available Robart* wheels). Accessory kits are available for fuel tanks, a cargo tank, cockpit detailing, removable fins and several coloring and paint schemes.

HITS

- **Malchione:** 100-percent scale—even the inlet and tail-pipe exhaust area; scale gear; reliable, durable, easy-to-build ducted-fan aircraft with excellent aerobatic flight performance.
- **Hogan:** the longevity of the Falcon and BVM propulsion system is very good to excellent, depending on how well the pilot/owner follows instructions and attends to details. No after-market options are offered or needed. Excellent flight performance.
- **Leshner:** comprehensive, well-written instruction manual; complete hardware package with extras. Construction took only five weeks, and finishing took an additional four.

MISSES

- **Malchione:** don't use flaperons in crosswind takeoffs.
- **Hogan:** the sole criticism is that the foam wing and horizontal tail jig could have fit around the fuselage more precisely. [Editor's note: BVM notes that the jig has been modified since the early kits.]
- **Leshner:** the only criticism was the difficulty experienced with the cockpit installation. A cockpit-panel hinging procedure is now suggested in the revised instructions which, with a fiberglass patch on the fuselage joiner seam, solves this problem. [Editor's note: BVM comments that the hinging procedure is outlined in the cockpit detail kit, but that flexing of the plastic parts of the cockpit should otherwise suffice.]

Scale panel lines and surface detail are molded into the fuselage. The beautifully finished, one-piece fuselage is unique for several reasons: all the access hatches are molded separately, which saves the builder hours of cutting. On the fuselage, there are molded dots that mark where the formers will be installed. Also, the gear doors

FLIGHT PERFORMANCE

[Editor's note: two pilots offer their observations—Dave Malchione, a BVM rep, and Jess Hogan, a licensed A&P mechanic, who has been building models since the 1940s and who has competed in F3A.]

• Takeoff and landing

MALCHIONE: on my first flight, after retracting the gear, the aircraft proceeded to climb effortlessly. (Notably, this aircraft generates 39 percent of its total lift from the fuselage.) One 360 overhead, and I knew this was a winner. One click of up-elevator and the aircraft trimmed out perfectly. My Falcon incorporates flaperons (they aren't necessary—my father doesn't use them on his); with flaperons, of course, takeoff roll is slightly shortened.

When you fly the Falcon, taxi into position, add full power, and the Falcon will track straight down the runway with little or no steering input needed. I've experienced crosswind takeoffs—if your model has flaperons, it's recommended not to use them in these conditions. At about 50 feet of roll, apply full-up stab. The Falcon will unstick at about 100 feet or sooner. If a bumpy runway exists, the aircraft will rotate sooner.

In the air, after the gear is retracted, the climb is established with a recommended turn so that the Falcon doesn't get too far away. Full-power acceleration is impressive, so keep the plane in good visual range.

The Falcon can be slowed down to half power with no trim changes and no altitude loss. At 25-percent power (i.e., approach power), the angle of attack increases and the gear is lowered. The speed reduces noticeably, and fine adjustments must be made with power changes.

In a landing approach, I establish a 2- or 3-degree glide slope with a 25-percent power setting. If the sink rate increases, power must be increased until the plane's sink rate decreases to the desired glide slope. Landings are nose high like the full-scale Falcon. Don't be afraid of firm landings; this airframe can take it. Allow a straight rollout, and taxi back when the Falcon has slowed. Grass-field operation with the Falcon is excellent with ground rolls of less than 150 feet.

HOGAN: with the nose-wheel steering adjusted true and the main gear installed according to the instructions, ground handling is good and produces no surprises. Landings aren't going to surprise anyone. On the high downwind pass, drop the gear with some power on so as not to lose altitude when the plane slows and turns. Make your base and final with this power level. When on final and lineup, bleed power so that you can land the plane precisely where you want it. Piece of cake!

• High-speed performance

MALCHIONE: there were no trim changes at any throttle setting. The plane is very stable in flight speeds of up to 190mph. In a dive, speeds of over 200mph are pos-

sible. Ground coverage is awesome.

HOGAN: the F-16 is quite fast on the top end and faster yet after a full-blown Split S. There is no tendency to porpoise or get skittish around the yaw axis. After reaching speed, it flies as if on rails. Climb rate after a high-speed pass is phenomenal.

A high-speed, "haul back on it" pylon turn results in just that—without any tendency to snap out. Speed decays rapidly in such a turn, but it returns quickly and safely. I didn't have to introduce any trim changes when I went from slow to high-speed flight.

• Low-speed performance

MALCHIONE: as the Falcon's speed slows down, extremely high angles of attack can be attained with no tip stall. At times, the plane seems to be flying almost at a standstill. At 25-percent power with an airspeed of approximately 30mph, pitch and roll maneuverability is still available without the need to change the trim.

When the aircraft is in the clean configuration, it takes a little time to bleed off air speed, but when the gear is extended, tremendous drag is created. This drag helps to slow the aircraft down. The plane will glide a long distance dead stick, but note that you should extend the gear only when landing is ensured.

HOGAN: with modern radios and variable-rate and throw adjustments, low-speed flying is at the pilot's discretion. Control authority remains good. With the plane slowed down to a minimum air speed, altitude can be controlled by a combination of power and back stick until you approach a stall. When you reach a stall, the F-16 will mush and wallow around. If allowed to continue, it will result in a "falling leaf," dutch-roll maneuver so long as some thrust is still there, but it absolutely will not tip-stall.

• Aerobatics

MALCHIONE: all pattern maneuvers are possible. Roll rates can be fast or slow. The tracking of rolls are straight with very minor elevator input. Slow rolls require very little rudder control. Knife-edge flight can be maintained until the Falcon is out of sight. Spins and snap rolls are as responsive as any pattern ship. Rolls, loops and breathtaking vertical performance are spectacular. This kills the old myth that 100-percent scale aircraft don't fly well.

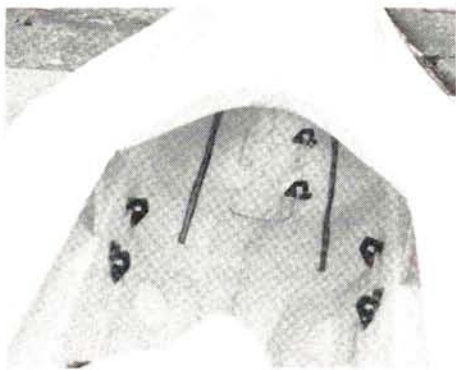
HOGAN: crisp rolls and smooth loops are the norm. Very solid, true, slow rolls are possible with relatively little rudder and pitch input. The rudder will hold sufficient knife-edge for flat 4- and 8-point rolls. Stall turns are a timing procedure in that you must maintain sufficient vertical speed when you kick in the rudder, since no propwash is present.



On approach for landing, notice the high angle of attack.

are already reinforced and incorporated in the fuselage, and all incidence references are clearly marked.

The sheeted wings, the balanced stabs and the fin are made of foam-core and balsa, and the carbon spars are already installed. Like the other



Wood-door reinforcements are already installed in the fuselage. Door hinges are installed before the doors are cut from the fuselage.

flying surfaces, the sheeted stabs with the pivot tubes installed have scale airfoil sections. The only construction required for the wings is to cut out the aileron and mount the rocket rails.

The main fuselage bulkheads are machine-cut out of end-grain balsa that's laminated with carbon fiber. All bulkheads come drilled so that landing-gear and equipment are located for a precise fit. The installation points for these formers are clearly marked on the fuselage.

ASSEMBLY

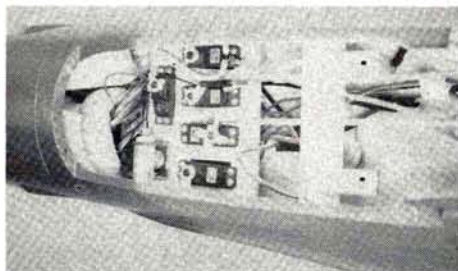
The assembly of this kit is straightforward. For example, attaching and aligning the wings and the stab is simple, because a foam wing and stab jig is included in the kit. Aligning and checking incidence angles—a process that can take days on some planes—can be accomplished in one evening.



A foam jig is used to establish the correct wing dihedral. The jig is turned over to measure the correct stabilizer anhedral.

READER'S REPORT

by JESS HOGAN



Radio installation is quick and easy—there's lots of room.

LANDING GEAR

The scale-looking, scale-operating, retractable landing gear is included in the deluxe kit. These units are pre-assembled and bolted to the drilled fuselage former. The main gear and the nose gear are pneumatically operated. This highly sophisticated system requires only one servo, and the operating doors work flawlessly. Like those on the full-scale Falcon, all three wheels rotate 90 degrees during operation.

THE POWER UNIT

I chose the BVM .81 engine for my Falcon. The Viojett fan I use is mounted on double, super-

soft mounts to absorb vibration and noise. To the best of my knowledge, the Viojett fan has been flown thousands of hours by many modelers without any rotor separation. I've flown ducted fans for more than 10 years and, in my experience, the BVM engine has been the most economical, with the lowest vibrations

Panel-line detailing is molded into the fuselage. Speed-break fairing hides the elevator horn.

and highest rpm at fan flys. These engines can power your ducted fans for several years without failing.

You'll be glad to know that the powerplant and the airframe are manufactured entirely in the USA. With ducted-fan aircraft, engine reliability plays a much larger role for a successful flight. Once the fan has been installed, and the wing, the stabs and the vertical fin have been mounted, the F-16 is almost completed.

FINISHING

Finishing the Falcon is a simple procedure, because there's no need to prime the entire fuselage. To cover the wooden surfaces, I used Fascal—a clear adhesive film supplied by BVM that goes on quickly and looks great. This film also adds less weight than glossing the surfaces

I had never built a ducted-fan but, encouraged by advertisements and the "modeler grapevine," I joined a waiting list for the BVM F-16 kit. BVM kept me informed as to the shipping date, and when the container arrived, I saw that it was certainly sufficient to prevent damage in transit. No fancy labels, etc., but inside, the contents were well-packed, carefully placed and tied down to prevent them from moving.

• **Construction.** The F-16 goes together quickly, and you're soon ready to install the wings and the tail. BVM provides a foam "jig" to help you set wing dihedral and horizontal stab anhedral. I found the jig satisfactory for aligning the wing, although it should have fit better around the fuselage contour. On the other hand, I didn't use the flying stab "jig"; the stab wouldn't sit on the jig and come close to the prescribed mold marks. Not to worry; I used the mold marks and the tried-and-true method of a flat work surface and accurate straightedge measuring tools. [Editor's note: BVM notes that the computer-cut, foam, building jig has been updated since the early kit runs.]

My F-16 finished a tad tail-heavy, so I put all the servos, the receiver and the battery pack as far forward in the radio bay as was feasible. I also poured a little "BB" shot mixed with epoxy into the inside point of the nose to obtain the proper CG. [Editor's note: BVM comments that the kit is designed to balance with various accessory applications, but that no kit has required more than 4 ounces of weight, which can be added in the form of useful battery capacity.]

There's plenty of room for fuel tanks and plumbing, servos and retract plumbing. Plumbing the retracts was a real experience; detailed and easily understandable instructions are provided.

• **Landing gear.** The landing gear may not be absolutely true to scale, but you'd have to be a wizard to notice. [Editor's note: BVM notes that perfectly scale landing gear could be achieved were 3,000psi available; model retracts use 120psi.] The important part is that it works. The

landing gear is very strong and is mounted so that it absorbs the shock of landings—even of hard, "dumb-thumb" landings.

• **Custom mods.** I arranged the MGA pilot and cockpit parts so that the whole cockpit, canopy, pilot, etc., could be removed as a unit. Any modeler could do this, although the "master scalers" would probably elect to customize this in their own way. I also mounted the tail cone to the exhaust duct with about eight BVM countersunk screws spaced evenly around the circumference of the tail cone (plenty of these poly-ply screws are provided in the kit). This facilitates the removal of the tail pipe and gives you quick access to the rudder servo and rigging. (The instructions show the tail cone glued on with RTV.)

• **Finishing.** I used polyester resin and 3/4-ounce glass cloth to finish the F-16—a method I use generally on balsa-skinned models. I used an automotive primer called "Evercoat Feather Fill," which is a polyester base that fills holes, etc., very well and is easy to sand. The water-transfer decal set is of good quality, and there are enough decals to "scale" many versions of the F-16C. The decals should be applied over a glossy base and then sprayed with a satin finish coat. If you use a new, very sharp, no. 11 X-Acto

problems. Make sure your landing gear and engine perform predictably before you fly. Spend time adjusting and becoming familiar with the F-16 while it's on the ground. I drove mine down an inclined driveway and adjusted the gear until the model tracked perfectly straight.

• **Power.** The high-revving BVM .81 engine needs a good, castor-mix fuel that has been blended for ducted-fan use. Starting the engine with a keyed

ball hex probe inserted into the fan spinner isn't difficult. I found it fairly easy to adjust the mixture with the hatch off. I recommend the use of ear protection when making adjustments at high power. In the air, the model is rather quiet for a ducted fan.

My "no-trim-needed" first flight was rewarding. There was severe rudder flutter (my fault), but with the tail-cone modification, this was quickly remedied (I removed the cone and tightened the cables). I've had no more flutter problems. [Editor's note: BVM comments that flutter is usually terminal at speeds over 140mph. To further guard against this problem, newer models will use a thicker cable, but the modeler is still responsible for good work.]

The F-16 is very fast when the engine is peaked with the recommended fuel. As with any engine, full power is never recommended for the entire duration of a flight.

• **Summary.** In my opinion, this kit is by far one of the best jet buys. BVM has done its homework, both in the design of the kit and the propulsion system. This is a kit that nearly any modeler will be able to handle. Certainly, any

modeler who has built or flown a modern pattern ship will find the BVM F-16C kit a piece of cake.

The key is to follow instructions and pay attention to detail. The F-16 isn't overly complicated, yet it can be a master scale project and can be flown with a sense of security. Yes, it's expensive, but I think it's well worth it.



Jess Hogan shows off his BVM F-16.



blade and carefully trim out the large areas of clear decal, after the finish coat has been applied, you'll have a painted-on look.

• **Handling.** It's evident that BVM spent a lot of time testing and re-testing this model to identify and remedy any problems that might arise. If you pay attention to detail, you'll minimize the chance of

by MIKE LESHER

I've been flying model jets since 1984, when I first took the plunge with a Byron F-16. I fly mostly off grass fields, so I was interested in advancing to a jet that could accelerate rapidly but also land slowly. In '87, I met my goal when I built a BVM Aggressor I. I still had a soft spot in my heart for the F-16, so you can imagine my excitement when

as well as several extras of each. Five sheets of high-quality water-transfer decals are included in the kit.

• **Construction.** Building the jet's interior is straightforward, and there's ample room to work in the fuselage. Most of the former locations are keyed to indentations molded in the fiberglass fuselage. The formers fit well in their re-

glass cloth with Pacer* epoxy resin.

• **Cockpit.** My only difficulty was with the installation of the cockpit section. To install the cockpit, the fuselage opening must be flexed, and in my case, the fuselage joiner seam at the front of the canopy tore slightly because of the flexing. My kit was an earlier one; the modified instructions now direct modelers to trim the fuselage flange panel where the canopy sits to approximately $\frac{3}{8}$ inch so that there's a bit more clearance for the cockpit during installation. I also found it helpful to cut and hinge the left side panel on the cockpit section. This allowed me to fold the panel inward for installation and then, when the cockpit was in the jet, fold the panel outward to return it to its proper position. I also recommend that you strengthen the fuselage seam by sticking a patch of glass cloth over it on the inside with CA. [Editor's note: BVM provides hinging instructions in the cockpit detail kit. Plastic parts of cockpits that don't use this option can be flexed to facilitate installation. BVM comments that flexing of the fuselage should be minimized.]

Preparing the gelcoated fuselage for painting involved only scuffing the surface with a 3M scuff pad and wiping it with a cleaning solvent. Pinholes were only found at the joiner seam. I painted my F-16 in the popular Thunderbirds' scheme using Hobby Pro* paints. Most of the paint work was rather simple, but laying out the Thunderbird design on the bottom of the jet was rather a lengthy process. The Thunderbird design and most of the markings are painted using the frisket method. (Frank Tiano discussed this technique in his February '92 "Sporty Scale" column.)

[Editor's note: BVM offers a new computer-cut paint mask that makes the Thunderbird paint scheme easier to accomplish.]

• **Radio and power.** I installed the Airtronics* Vision 8P ra-

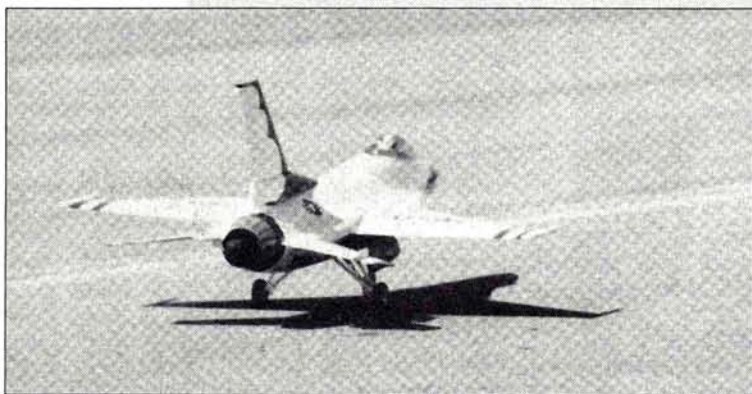
dio with coreless 732 servos—all powered by an SR Batteries* 1200mAh flight pack. With only minor adjustment of the battery pack's position, the jet balanced without additional weight. The jet's dry weight is 12 pounds, 10 ounces, and it's powered by the Viojet/BVM .81 with the new Puffer Pressure quiet pipe offered by BVM. The BVM .81, which is made for BVM by Nelson Competition Engines, seems to be more powerful than the KBV .82 but vibrates less.

• **First flight.** I began the project in the summer of '91 and completed it in time for the October '91 Superman Fan Fly. At the Fan Fly, accomplished jet pilot and BVM rep Terry Nitsch flew the jet on its check-out flight. Landing the F-16 isn't difficult, but it's different from other jets. With the Aggressor, I'd set up long, flat approaches during which I'd work to slow down the jet. With the F-16, the pattern is entered at approximately 150 feet and the throttle reduced to 25 percent. The gear is lowered when you turn onto final because they act like speed brakes. After setting the aircraft into a slight nose-high attitude, throttle is used to adjust the rate of descent, and the stabilators are only used to flare for landing.

Terry advised that if there's a crosswind, it's better to fly the F-16 to the ground as in Navy carrier landings. The main gear is strong and will absorb the shock of most hard landings. With low winds, you can flare this bird on touch-down, landing on the mains and keeping the nose up until the speed bleeds off, just like the USAF pilots do.

• **Summary.** From the exquisite landing gear to the carbon-fiber door hinges, the kit shines with quality. Although, at \$1,200 for the deluxe kit, it isn't inexpensive, I've found that the model works as advertised, factory support is great and all this, in my opinion, amounts to one of the greatest values for your modeling dollars. If you're ready to take the plunge into model jets, the F-16 will get you off to a great start.

READER'S REPORT



Mike Lesher painted his Falcon using the popular Thunderbird scheme.

BVM announced the release of an F-16C with scale operating main gear and gear doors.

• **The kit.** A well-written, 30-page manual leads the experienced builder through the construction phase, explains finishing techniques and offers information for the first flight. Three, clear photo sheets complement the manual; three, large, blue-line drawings show the positions of the formers and components.

A light gray gelcoat covers the epoxy/glass fuselage and other fiberglass pieces. This all but eliminates pinholes and makes it easier to finish the model. The wings have the scale under-camber and washout built into them.

The die-cutting of the wooden parts was excellent; the pieces literally fell out of the blank and required only minor finish-sanding. The hardware package included every nut, bolt, hinge, etc., that's needed

spective positions, and the main gear-mount formers already have gear-mount holes; this results in a precise gear alignment. With the formers installed properly and the main gear bolted into place, I retracted the complex main gear and found that only minor adjustment was needed.

Before glassing the parts,



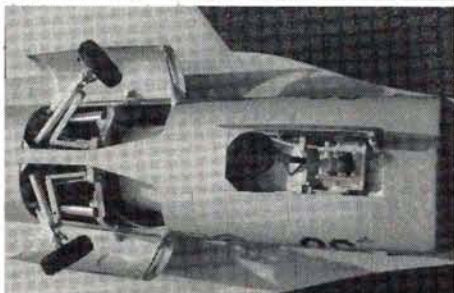
you just have to cut the flaperons out of the wings, cut the rudder out of the vertical stab and finish-sand the balsa sheeting. To seal the balsa and strengthen the surface, I used K&B $\frac{3}{4}$ -ounce

does. My F-16 and my father's F-16 have endured a summer of direct sunlight with temperatures as high as 120 degrees, and there's been no sign of bubbling or lifting.

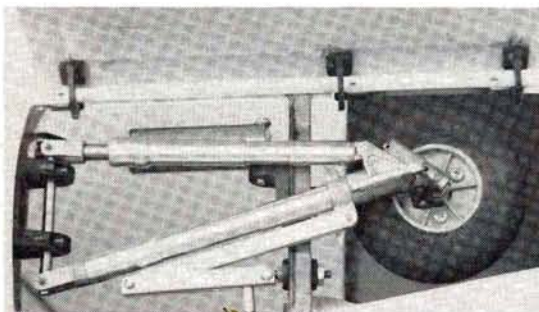
After the film was applied and lightly sanded, the surfaces were primed with K&B* primer and lightly sanded again. The base color on our two F-16s is K&B Super Pox, and the rest of the colors were applied using Testor's* Model Master paints. Yes, Testors! These inexpensive paints produce an authentic-looking plane. When I first heard about using Testors, I was skeptical, until I spoke with Bill Harris, who assured me that I'd be pleased with the effect. Testors can be easily removed with thinner, in case you don't like what you see. There's very little overspray with this paint, and it's fuelproof. To protect the decals and the markings, I used Ditzler's* Del Clear.

RADIO

Any 5-channel radio is capable of flying the Falcon. I chose JR's* X-347, which is more than



Sequence of gear retraction shows all three wheels rotating 90 degrees.



The right main gear is shown retracted in the wheel well.

adequate for the F-16. I chose it because one of the aircraft uses flaperons. The other Falcon is equipped with the JR Max 6-channel, which also proved to be an excellent choice. No special servos or fancy control hook-ups were required. Only three servo extensions were required to install the radio. Just install the radio and servos according to the instructions; no modifications are necessary. If you don't incorporate the remote mixture control, you'll have to add 1 ounce to the nose to obtain the proper CG after the radio has been installed.

CONCLUSION

Bob Violett Models has produced a superior product. The project costs approximately \$1,200 without a powerplant. This sounds expensive, but the bottom line is that you'll have a 100-percent scale, competition-ready, durable, ducted-fan aircraft that's capable of speeds that range from 30 to 180mph. Remember: you get what you pay for.

If you're thinking that such a complex model requires a lot of maintenance; don't worry. For practical purposes, the Violett staff has eliminated this task.

From start to finish, this kit was a pleasure to build and fly. When I purchased my Falcon, I also received, free of charge, the combined expertise and support of the entire Violett staff. The F-86 made it to the winners' circle; the Falcon is sure to follow.

*Here are the addresses of the companies mentioned in this article:

Bob Violett Models, 1373 Citrus Rd., Winter Springs, FL 32708.

K&B Mfg. Inc., 2100 College Dr., Lake Havasu, AZ 86403.

Testor Corp., 620 Buckbee St., Rockford, IL 61104.

Ditzler Industries, P.O. Box 3510, Troy, MI 48007.

JR Propo; distributed by Hobby Dynamics Distributors, P.O. Box 3726, Champaign, IL 61826.

Airtronics, 11 Autry, Irvine, CA 92718.

SR Batteries, P.O. Box 287, Bellport, NY 11713.

Robart, P.O. Box 1247, St. Charles, IL 60174.

Hobby Pox; a division of Pettit Paint Co. Inc., 36 Pine St., Rockaway, NJ 07866.



The nose gear with carbon-fiber flex arms is shown in the pre-drilled former.

New Giant Scale TR-260+ Pre-Built

(All wood—no foam)



John Eaton's TR-260+
List price: \$895
Intro price: \$595

Fully Aerobatic laser-type hand-built in Thailand of balsa and ply. Covered in two-tone Ultracote. ABS cowl, hatch cover and wheel pants. Fiberglass options and full replacement parts available. Excellent slow-flight characteristics.

Wingspan: 92" Length: 65"
Weight: 16-19lbs. Power: 2-4ci

S&H \$20 (COD add \$5; CA res. add 8.25% tax).
Address for J&K Products listed below.

New Giant Scale TR-260 Kit



John Eaton's TR-260
List price: \$325
Intro price: \$249

Kit version of the pre-built. Aerobatic laser-type mid-wing with symmetrical airfoil. Kit includes full-size plans, gear, canopy, ABS cowl, hatch cover and wheel pants. All parts die-cut balsa and ply (no foam). Fiberglass options, accessories and full replacement parts available. Excellent slow-flight characteristics.

Wingspan: 90" Length: 65"
Weight: 15-18lbs. Power: 2-4ci

S&H \$20 (COD add \$5; CA res. add 8.25% tax).
Address for J&K Products listed below.

New Giant Scale P-51 Kit



John Eaton's P-51
List price: \$795
Intro price: \$500

True-scale and Reno-Race legal! Three-time winner as Miss America no. 52. The second in Bronze at Reno Unlimited; best in Stand-off Scale at Las Vegas QSAA; first place in Pylon Racer at IMS. Foam-and-balsa wing, carbon-fiber-reinforced spar and fiberglass fuse. Accessories available including scale wheels, struts and retractors.

Wing Span: 101" Length: 84"
Weight: 30-35lbs. Power: 4.2-5.8ci

S&H \$50 (COD add \$5; CA res. add 8.25% tax).
Address for J&K Products listed below.

J&K Products (A division of Model Center)
2304 W. Redondo Beach Blvd.,
Torrance, CA 90504 (310) 327-3862
(Check, money order, or COD only.)

GOLDEN AGE OF R/C



HAL DeBOLT

BIPES AND TIDBITS



PHOTOS BY HAL DeBOLT

The spoils! You get your picture taken with the Queen of the Nats! (It's me at the '57 Philly Nats.)

YOUR LETTERS have been piling up, so it's logical to make them a priority this time, and our discussion of early R/C biplanes continues to be a hot topic.

I told you about how I thought I had created something original by adding a Live Wire (LW) Trainer wing to the bottom of a LW Senior to make a fine bipe. Then Col. R.O. "Bob" Mosher (now of San Antonio, TX), who was in Germany at that time, topped that with a similar mod and won some prestigious European meets with it. Bob sent us a photo of his version in full flight. Powered by a Fox .29 using a "butterfly" choke on the venturi for engine control, his "Cruiser-bipe" was controlled by a 3-channel Babcock radio that operated rudder, elevator and engine controls by means of escapements.

Bob now lives in a retirement center with a couple of hundred USAF pilots, and on weekdays, they dominate a local club's R/C field. Bob flies everything from from 1/2A to giant scale—all using his much-liked Ace 8000 radio. (He also praises his Saito 270.) While in Germany, Bob encouraged many to take up R/C, including OT R/Cers Joe Solko

and Chuck Walters (D.C.), with whom many of us are familiar.

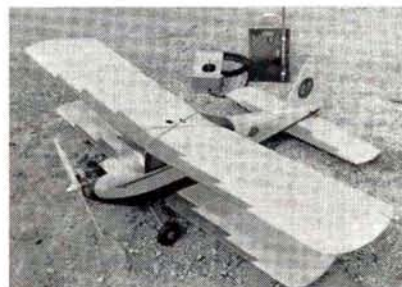
I don't want to belabor this bipe bit, but some of your stories are too good not to pass on. Would you believe that Dick Schwieren of Burns, OR, built an LW Custom bipe in 1974? In the US Air Force, he was transferred before he could fly it, and he left it stored in his mother's attic—until now. He recently dusted it off, installed an O.S. Surpass .48 and found that its ample wing area was just what he needed at a 4,000-foot elevation. To explain: on retirement, he bought a small ranch in a cross-roads community and established a flying field outside his front door. He was soon tired of flying alone, so he enticed some of the locals into flying R/C, and now, they're flying up a storm! Dick was a close friend of genius Jim Walker and enjoyed flying with him for many years.

Still on the subject of bipes: Don Huff, now of Sunnyvale, CA, made a nice, much appreciated, gesture. He provided some photos of some of my competition bipes, and they may bring back some memories. One of the photos shows a .19-powered, smaller version of my one-of-a-kind LW Custom. I had added flaps to this one, but their use on this type of design proved questionable; when I lowered them, the model came to a halt in any wind! While stationed in Dover, DE, as an Air Force C-124 navigator, Don entered the '57 Nats at Philly in "single channel." Unfortunately, his Breezy Jr. was "shot down" when someone unknowingly turned on a Mac II transmitter in the hangar work area. This was one of the perils of the "carrier only" 27MHz system we had to contend with! (It did allow him the time for some photos, though.)

Don says "Golden Age" columns take him back to his early

R/C days and the many wonderful R/C models, including all the Live Wires. Thanks, Don, for the cherished photos and fine letter.

In a short note, Brian Mercer of Perth, Australia, bemoans the fact that modern manufacturers neglect the "single-stick" transmitter and says he enjoys the excellent performance of his U.S.-made Millcott* system. Millcott took over Orbit



The one-of-a-kind, .19-powered junior version of the LW Custom flown in AMA pylon at the '57 Nats. Note the ground-based Bramco system and control box.

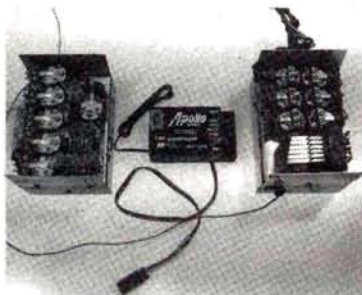
and produces fine specialized systems, including single sticks! (If you want to contact Milcott, you'll find the address at the end.)

Lew Hiebert of Hesston, KS, wrote looking for Aero 9 plans because he wanted to duplicate the one he had enjoyed so much back in '59. Frank Zaic put him in touch with his brother John, who manufactured the Aero series kits during the late '50s; so Lew found his Aero 9 plans and is able to build a replica.

MYSTERY MAINTAINED

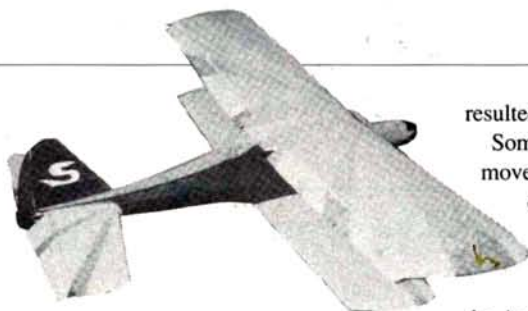
Do you remember the "mystery plane" I showed some time ago, hoping someone might recognize it? Sorry to say there have been no complete answers. OT R/C pioneer Frank Madl (Chicago area) didn't have any clues, but he's still active, and his stories would fill a book. How about this one? At the '40 Chicago Nats, his Cavalier was on a takeoff run when an unprepared Navy guard had to zigzag to avoid it. The big Cavalier hit him, but fortunately, he

(Continued on page 38)



One mystery solved? In the mid-'50s, Stan Vana and his father were deep into R/C development. Note the rare 6-channel reed receiver and, for comparison, the modern receiver.

GOLDEN AGE OF R/C



Dust of ages! Dick Schwier's LW Custom comes out of storage and flies. Note the flaps and ailerons, which were built as the plans suggested.

was wearing a helmet. The plane's wing broke, though! (Even when our cantankerous radios worked, we faced other hazards!)

I did receive a possible clue to the identity of the mystery plane's "6-channel" reed system. I couldn't remember any commercial 6-channel reed system; they were only offered in three, five, eight, 10 and 12 channels. Stanley Vana of Oaklawn, IL, wrote to say that, in the '50s, he and his father did considerable experimentation with radios, servos and even some engines. He thinks the mystery radio might be one of the 6-channel receivers they built, because the apparently home-made reed bank and the "Gem" relays look very familiar to him.

Stan says they flew at a Chicago field called "Kickapoo Woods," and their ace pilot was none other than Ed Kasmirski. He also says that R/C planes still take to the sky over Kickapoo.

GAFFER'S GOOF!

You people really wake up when we label a photo incorrectly, or get some dates wrong! We identified a photo in the November '91 issue as being of a Jim Walker model. That brought some photos and a fine letter from R/C pioneer and good friend Fran McElwee of South Plainfield, NJ. Fran writes that the model was, indeed, a Walker look-alike, but Fran built it, and he identified it by his AMA number on the wing and the 27MHz ham band. The clincher is that the person in the photo is his brother-in-law Roy Messenger. We live and learn!

How this came about is a long, interesting story that I'll save until next time, but I'll say that in '52, Fran and Jim became friends and were involved in a project that

resulted in their having similar models.

Some time ago, I reported on a British movement that involves flying OT pattern designs in semi-competition. The idea was well received by British modelers, and I suggested that perhaps something similar would fit the American scene.

I hope that you saw the February '92 *Model Aviation* report on a new OT R/C organization and its first activity. According to the report, Mickey Walker of Smyrna, GA, has organized a Senior Pattern Flyers



Col. Mosher's contest-winning '50s Cruiser biplane.

Association, and their first event was an outstanding success. Their activities sound great, and I've asked for more information to pass on to you.

I'll keep this short to allow room for the photos. Just remember, this is *your* OT R/C place and we all enjoy your input!

**Here's the address that's pertinent to this article:*
Millcott, 5595 Heathlake Rd., Sagle, IN 83860.

ORBIT IN ORBIT?

Our recent "Branstner Story" was widely acclaimed; many expressed amazement at Dick Branstner and Bramco's accomplishments. The tale brought back memories for others, and Bob Dunham and Orbit were often mentioned.

In the past, I've mentioned how R/C pioneer Bob Dunham had to develop his own simple radios just to have something to fly with. His initial success led him from running a hobby shop to manufacturing radios, and his operation soon expanded worldwide with the "Orbit Black Box." As many an R/Cer put it: "If it's an Orbit, it works!" There was a progression from single channel through the heyday of reed systems, to the first commercial propo systems and, eventually, to today's basic systems. To our disappointment, Bob left R/C too early.

Of further interest is that, like Bramco, Orbit also applied R/C to uses beyond modeling. Orbit was responsible for laying groundwork that led to today's widely diversified use of R/C.



Genial Bob Dunham and his 1960 Detroit Invitational trophy.

with R/C. Can you imagine the servo power that was required to operate those controls?! Ironically, when one of the operators was being trained to use R/C, he managed to run one of the huge machines over the brink? Must have been a sizeable crash!

Yes, fellas, our R/C pioneers *did* have amazing vision!

ORBIT T-4 & R-4 AND T-6 & R-6
ALL TRANSISTORIZED TRANSMITTER & SUPER-HETERODYNE COMBOS. NON-SIMULTANEOUS.

TRANSMITTER T-4 & T-6		RECEIVER R-4 & R-6	
4 watt operation. High output. One of the most powerful and reliable radios ever made. Features: 400,000 cycle oscillator, 400,000 cycle amplifier, 400,000 cycle detector, 400,000 cycle mixer, 400,000 cycle converter, 400,000 cycle oscillator, 400,000 cycle amplifier, 400,000 cycle detector, 400,000 cycle mixer, 400,000 cycle converter.	400,000 cycle oscillator, 400,000 cycle amplifier, 400,000 cycle detector, 400,000 cycle mixer, 400,000 cycle converter.	400,000 cycle oscillator, 400,000 cycle amplifier, 400,000 cycle detector, 400,000 cycle mixer, 400,000 cycle converter.	400,000 cycle oscillator, 400,000 cycle amplifier, 400,000 cycle detector, 400,000 cycle mixer, 400,000 cycle converter.
Size 1 1/2 x 1 1/2 x 1 1/2	Size 1 1/2 x 1 1/2 x 1 1/2	Size 1 1/2 x 1 1/2 x 1 1/2	Size 1 1/2 x 1 1/2 x 1 1/2
R-4 (4 channels) \$65.00	R-6 (6 channels) \$69.00	T-4 (4 channels) \$69.00	T-6 (6 channels) \$79.00

ORBIT
1511 BRADY STREET
MILWAUKEE, WISCONSIN

An Orbit Electronics ad of 1964; propo was offered, but it was still for reed systems.

Did you know that Orbit was involved in the NASA moon exploration program? One project was to develop the two-way personal communication system the astronauts would use on the moon, and NASA turned to Orbit because of its reputation for extreme reliability. Another NASA project was a "transmitter" that was to be "soft-landed" on the moon before the astronauts touched down. Modified simple Orbit reed systems were used to control TV cameras during atomic tests.

A more mundane project involved "open pit" sulphur mining with bulldozers. Apparently, there was some concern that an operator might accidentally run a 'dozer over the pit's brink. Orbit's answer was to control it from a distance

with R/C. Can you imagine the servo power that was required to operate those controls?! Ironically, when one of the operators was being trained to use R/C, he managed to run one of the huge machines over the brink? Must have been a sizeable crash!

PILOT PROJECTS

A LOOK AT WHAT OUR READERS ARE DOING

SEND IN YOUR SNAPSHOTS

Model Airplane News is your magazine and, as always, we encourage reader participation. In "Pilot Projects," we feature pictures from you—our readers. Both color slides and color prints are acceptable.

All photos used in this section will be eligible for a grand prize of \$500, to be awarded at the end of 1992. The winner will be chosen from all entries published, so get a photo or two, plus a brief description, and send them in!

Send those pictures to:

Pilot Projects, Model Airplane News, 251 Danbury Rd., Wilton, CT 06897.



GRAND GULFHAWK

From Spokane, WA, this G-22 Gulfhawk is the pride and joy of William Thamm (it's displayed here by Grandma Bev). The all-balsa, 54-inch biplane is powered by a Super Tigre .90 and weighs 9.5 pounds. The Solartex-and-enamel-paint finish duplicates the full-size plane's color scheme according to documentation that William acquired from the Smithsonian Institution's Air & Space Museum. The model looks great, as does Grandma Bev.

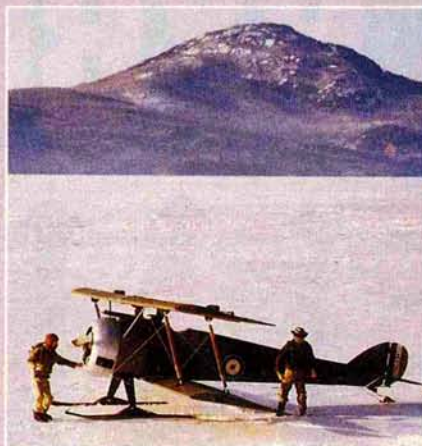


FABULOUS SEA FURY

Fred Menna of North Scituate, RI, scratch-built this beautiful model from Don Smith plans in only nine months. Powered by a Super Tartan Twin, this 28-pound aircraft has an 86-inch span. Its appointments include retractable main and tail landing gear, flaps, a sliding canopy that's controlled by transmitter, functional exhaust and engine-cooling ducts and an on-board glow ignition. The finish is Chevron's Perfect Paint over Dan Parsons' fiberglass cloth. To date, Fred has logged more than 20 successful sorties with his wonderful air warrior.

SORT'A SOPWITH

After about a year of "eyeballing" pots, pans and plastic containers at local stores, Harry Farfan of Montreal, Quebec, Canada, found the perfect cowl for his sort'a-scale Sopwith. The pilot and copilot look rather bewildered; they almost flew into Owl's Head mountain before they landed on frozen Memphremagog Lake. We want to know where the copilot sat in this single-cockpit aircraft! (A winter wing-walker?)



BEAUTIFUL BOEING

This classic P-12E is the work of Dean Bartmess of Deltona, FL. With a 90-inch wingspan, this 1/4-scale model weighs 30 pounds and is powered by a Quadra 52. Dean controls it with Futaba electronics. The Super Coverite finish is painted with Chevron Perfect Paint. Dean scratch-built the model from plans he received from Wright Patterson's Air Force museum. The hangar in the background adds to the flavor of this vintage fighter.



PILOT PROJECTS



PHANTOM FORMATION

Gary Baker of Houston, TX, sure loves F-4s. In fact, he built both of these beauties and painted them to resemble the local Texas Air National Guard unit. The plane in front is powered by a single Dynamax fan and an O.S. .91 engine and weighs 15.5 pounds. The other is powered by twin Dynamax fans and two O.S. .77s and comes in at 19 pounds. Both aircraft are controlled by Futaba 7UAP radios, and each was built from the George Miller kit.

SUPER 17

This pristine PT-17 is the handiwork of Leo Wolf of Riverfalls, WI, and its photo was submitted by his friend and fellow flier Art Marcyan of Oakdale, MN. (Leo was too modest to submit a photo, so Art took the liberty.) Although it started as a Royal kit, Leo made many changes to the PT-17 to improve its scale outline, e.g., scale flying-wire location and attachment points, metal panels and a brass windshield frame. The Saito 1.20-powered model is covered with Super Coverite and automotive paint; all the markings are painted on. (Leo copied the color scheme of a PT-17 that flies at local air shows.) Let's give credit where credit's due: we think Leo did a great job.



ROYAL KAWASAKI

After working on it for two years, Jeff Weiss of Sacramento, CA, finished this beautiful Kawasaki Ki-61. The model, which Jeff built from the Royal kit, is powered by a Skyward .80 engine and controlled by a Hitec 7-channel radio. The model has split flaps and retracts, which are dressed up with Robart

Robo-Struts and sequential inner gear doors. A look into the cockpit shows that the improvements aren't just skin-deep.

ITALIAN AIR FORCE

Roberto Nicetto of Padova, Italy, sent us this shot of his two great scratch-built, balsa-and-foam models. The first is a P-51 Mustang with a 74.81-inch wingspan. It's 61.6 inches long, weighs 16.5 pounds and is powered by a Super Tigre 3000. The 55.6-inch-long AT-6 Texan is powered by a Super Tigre 2500, has a wingspan of 78.85 inches and weighs 15.4 pounds. Both models use pneumatic retracts, and both have been in the Italian model magazine "Eco Model." Roberto says he likes his models to look like "the real thing," and he considers himself to be a good builder. We have to agree!





Bob Violet's newly released giant T-33 Shooting Star.



Above: Jerry Goss with his super-fun-scale DC-3—this plane flies well, and it's cheap and easy to build. Left: Less Fruh with his Acro Dancer.



Here's Tom Gruenbaum, his wife Marilyn and his Sig Spacewalker, which flies superbly.

R/C FLY-IN AND AIR SHOW ATTRACT THOUSANDS



Above: Phil Corso with his Byron F-18, which flies beautifully!



Above: Herschel Bunch with his Super Hots—very fast and aerobatic.

Right: Cecil Hudson's original design—a "flowerpot" ducted fan!



Above: Joe Grabel's Balsa USA Cub won the Best Civilian Model award.



Here's Jim Boyd with his giant P-51. The plane won the Best Military Model award.

R/C WORLD'S



Bob Fiorenze works on his Yellow F-18.



Eric Dern and his showstopper—the TWA Lockheed Constellation.

THE R/C WORLD FLYERS held their 8th Annual Fall Festival on November 29 through December 1, 1991, at their flying site in Orlando, FL, and it was the biggest one ever. There were 131 registered pilots and 180 model airplanes. With contestants from Pennsylvania, New York, New Jersey, Vermont, Georgia, Illinois, Connecticut and Florida as well as Canada, France and Germany, it was truly an international event.

Spectators came in droves. I estimate that there were between 3,000 and 4,000 of them, because we parked more than 400 cars on each day of this holiday weekend. Tents were set up for the sale of food tickets, T-shirts, hats, and R/C videos, and there was an area set aside for tailgate vendors, too. The smell of hamburgers, hot dogs and popcorn filled the air. It was like being at a county fair.

SHOWSTOPPERS

This fly-in was "CD'd" by yours truly, Wally Zober, and my assistant, Norm Holland. There was a tremendous amount of help from the club members and their wives. On the first day, we had some problems with the flight line (it moved too slowly). After a few complaints, we made a major change to the old sign-in, first-come-first-served approach, and the new system worked just fine. Giving 131 R/C pilots and 180 planes equal time in the air is no easy task, but we did it!

We also put on a spectacular air show each day between 12 noon and 1:30 p.m. (This fly-in/air-show combination is very popular in the Southeast.) The main feature of the show was one of the best R/C model air-show teams in

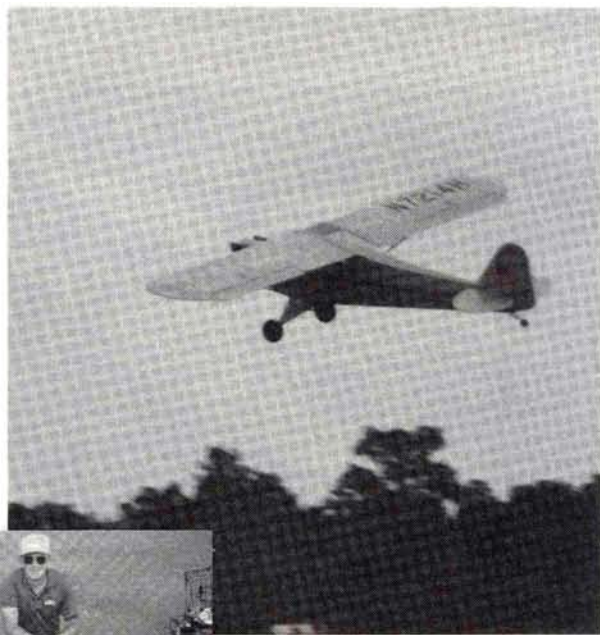
kids loved it! Next came a super-aerobatic R/C model—the Amazing Flying Machine—that did maneuvers I can't even begin to describe, but they sure excited the crowd.

For the finale, the Cloud Dancers flew two giant-scale Byron F-15s in a formation routine—just like the Blue Angels. You have to see this show to appreciate it. The guys are real pros.

Next came the Wild Thing Dog Fighters. Each of these small .19-powered aircraft tows a 10-foot-long string with a 20-foot-long papier-mâché streamer. The idea is to cut off another flier's streamer and, usually, there are one or two midair crashes while the pilots try to do this.

Another exciting air-show routine was put on by Bubba Spivey, proprietor of Lanier R/C Products, and his friend Wayne Voyles. Both flew Stingers, which are manufactured by Lanier, and they did some truly heart-stopping maneuvers, e.g., high-speed, low-level inverted passes at 3 or 4 feet above the runway and inverted flat spins. Thick white smoke poured out of the planes as they pulled out of these spins at 25 or 30 feet above the ground—real heart-stoppers.

The next performer was Bob Fiorenze—Mr. "Top Gun" himself—who put on a spectacular routine with his large, twin-engine Yellow Aircraft F-18 done up in "low-viz" livery. Bob, who's a great pilot and a superb showman, flies his F-18 right to the leading edge—no holds barred. He knows his aircraft and how to get the most out of it.



John Schroder's J-3 Piper Cub in flight. It's powered by an Enya 90 and flown with an Airtronics radio.



Dale O'Daniel with his gorgeous Byron Sukhoi 26M.



Above: Ray Helping (center) and his crew with the stunning DC-3 built from Ziroli plans. It won the Best of Show award.



Art Schneider's Commander weighs 50 pounds and sports a 12-foot wingspan.

8th ANNUAL FALL FESTIVAL

by WALLY ZOBBER

the country—the renowned Cloud Dancers of Kissimmee, FL. Their routine starts with five R/C robot parachutes, which are dropped from an altitude of 600 or 700 feet and controlled by pilots on the ground. The parachutes are very realistic—areal crowd-pleaser.

This was followed by "Bulla" the witch—a 1/2-size model of a witch on a broom. She sure looked real, and the

With flawless, super-high-speed, low-level inverted passes (the twin rudders were just a few feet above the runway!), knife-edge flights and four-point rolls, his routine was poetry in motion.

Another showstopper was Eric Dem's giant Lockheed Constellation done in the TWA color scheme. The "Connie" was flown by Don Lowe who did a superb job. Engine problems de-

Powered by two O.S. 91s and controlled by a Futaba radio, Joe Fiore's very pretty Cessna 310 was another large model that flew well.



R/C WORLD'S 8TH ANNUAL FALL FESTIVAL



Above: Norm Holland's superbly flying Balsa USA Sopwith Pup. **Left:** Bill Hokes with his military version of the Piper L-4. It's a "neat-flying" plane.

layed takeoff for a few minutes (the problem was eventually solved by changing the fuel), but it was worth the wait. After Eric and his pit crew had fired up all four engines and got them "synched out" perfectly, Don taxied the huge model onto the runway. He did a final engine run-up and checked all the controls. When everything sounded and looked right, Don added power slowly. The Connie picked up speed quickly and rotated with authority. The crowd let out a cheer as this giant model gained altitude. Don made several circuits of the field and a couple of high-speed passes, and then he brought the Connie in for a perfect landing. Again,

then hundreds of kids ran out to gather it. This performance was also a real crowd-pleaser.

AWARDS

During this three-day event, we had what I call a "Pilot's Raffle." Every pilot who registered could win anything from a \$1.50 Master Airscrew prop to an 8-channel Airtronics Quantum radio. We gave away more than \$3,000 worth of prizes, and the pilots loved it!

We also gave out awards in the following categories:

- **Best of Show** was awarded to Ray Helping, who built and flew a beautiful Ziroli DC-3. This model was a real show-stopper. I've never seen a Ziroli design that didn't fly well, and that's the truth!

- **Best Military Model** went to Jim Boyd, who came all the way from Canada, for

his giant-scale Bud Nosen P-51. With a Sachs 4.2 engine, functional flaps, Likes Line retracts and a Multiplex radio, Jim's plane flies extremely well. It has logged more than 200 flights.

- **Best Civilian Model** went to Joe Grable, who flew an absolutely gor-

geous $\frac{1}{3}$ -scale Piper J-3 Cub that's powered by an O.S. 320 and controlled by an Airtronics radio. The completely scratch-built Cub flies very realistically, and it looks great in the air.

- **Best Sport Model** was won by Dale O'Daniel for his beautiful Byron Sukhoi 26M, which is equipped with a Zenoah G-62 engine and a Futaba radio. Dale's model has a beautiful lacquer finish, and it flew very well, indeed.



MORE MAGNIFICENT MODELS

Norm Holland, an old campaigner in the giant-scale world, flew his absolutely gorgeous Balsa USA Sopwith Pup. Powered by a Saito 2.7 engine and controlled by a JR radio, this airplane flies at scale speed and is really impressive in the air.

Another beautiful airplane at this fly-in was Tom Gruenbaum's stunning Sig Spacewalker. With a Quad 4.2 engine, an Eric Dorn three-blade 17x10 prop and an Ace Micro 8000 radio, this plane was rock-solid in the air. He told me it was a real pussycat to fly.

Jerry Goss had a very interesting DC-3 that was a fun-scale model. The box-style fuselage is made of $\frac{1}{8}$ -inch-thick door skins and covered with aluminum MonoKote. The plane's two Super Tigre 61 engines provide it with more than enough power. Controlled by a Futaba radio, this fun-scale model flies beautifully, and it was inexpensive to build.

Bob Violett had three beautiful jets at this fly-in: a new T-33 Shooting Star, an F-16C and an Aggressor II. He made spectacular flights with his F-16C and his T-33 mod-

els. It's hard to say which one attracted the most attention. Many spectators and fliers asked Bob questions about these two exquisite models. Both are extremely aerobatic. The T-33 is an ideal model for fliers and builders who like giant-size models, and its flying characteristics make it a great entry-level jet. With precision and authority, Bob flew both models through routines that included 4-point, 8-point and reverse rolls. His loops were perfect—as if drawn using a compass—and his vertical maneuvers were awesome.

Bob is a disciplined flier, but he can also hot-dog a model jet. We didn't have a speed trap set up, but he made some high-speed passes—both upright and inverted. The speed of his F-16C had to be more than 170mph. To fly that fast, you need a lot of confidence in your flying skills and in the model.

Although it isn't as fast as the F-16C (it's not supposed to be), the T-33 has one very nice feature: it's big, so it's easier for us gray-haired pilots to see in the air. The T-33 has no problem taking off from grass fields. With his F-16C and his T-33, Bob has two winners.

Bink Snodgrass brought his beautiful Byron $\frac{1}{5}$ -scale Grumman F6F Hellcat to the meet. It's powered by a Sachs 4.2 engine, and it swings an Eric Dorn 20x11 $\frac{1}{2}$, three-blade glass prop. Bink, who's an excellent pilot and who likes to hot-dog his F6F, uses a Futaba radio.

Phil Corso flew two great-looking Byron Jets with superb flight characteristics—a large F-15 powered by a pair of O.S. 70 engines with Byron fans and a Byron F-18 with an O.S. 91 engine. Phil uses a Futaba radio and his new Aerocell flight packs.

Another very pretty—and very interesting—airplane was Hershel Bunch's Super Hots. It's a fast, aerobatic model powered by an O.S. FS-70 engine and controlled by an Airtronics radio.

Every fly-in has one entry that can be categorized as "weird," and ours was no exception. Cecil Hudson brought his original design—a ducted, or should I say "shrouded," fan model that he calls the "Ultra Fan." This twin-boom

(Continued on page 69)



Mike Hayes' Sig $\frac{1}{4}$ -scale clipped-wing Cub was very pretty, and it flew well.

the spectators applauded enthusiastically.

The finale of the air show was Eric Dorn's Candyman. He designed it to carry and drop streamers and about 10 pounds of candy. Eric flew the model up to about 400 or 500 feet, released the candy, and

CENTER ON LIFT

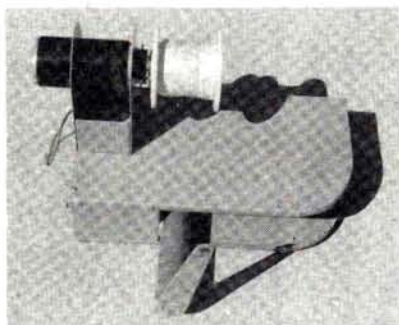
MICHAEL LACHOWSKI



WINCH LAUNCHES; SKY ENCOUNTER

WELCOME TO a new *Model Airplane News* column on soaring. The purpose of this column is to provide tips and techniques to improve your construction and soaring skills, teach you about new equipment, share experiences of different products and sailplanes, encourage design improvements and, finally, to help you have more fun at the flying field.

I've always been fascinated by soaring. My first R/C flights were with gliders, and they remain my favorites. Every day, there are rising and falling air currents. Searching for the rising currents is a challenge you can pursue almost any day of the year—too bad, most of us have to work.



VMC Flight's new high-start and winch retriever function well.

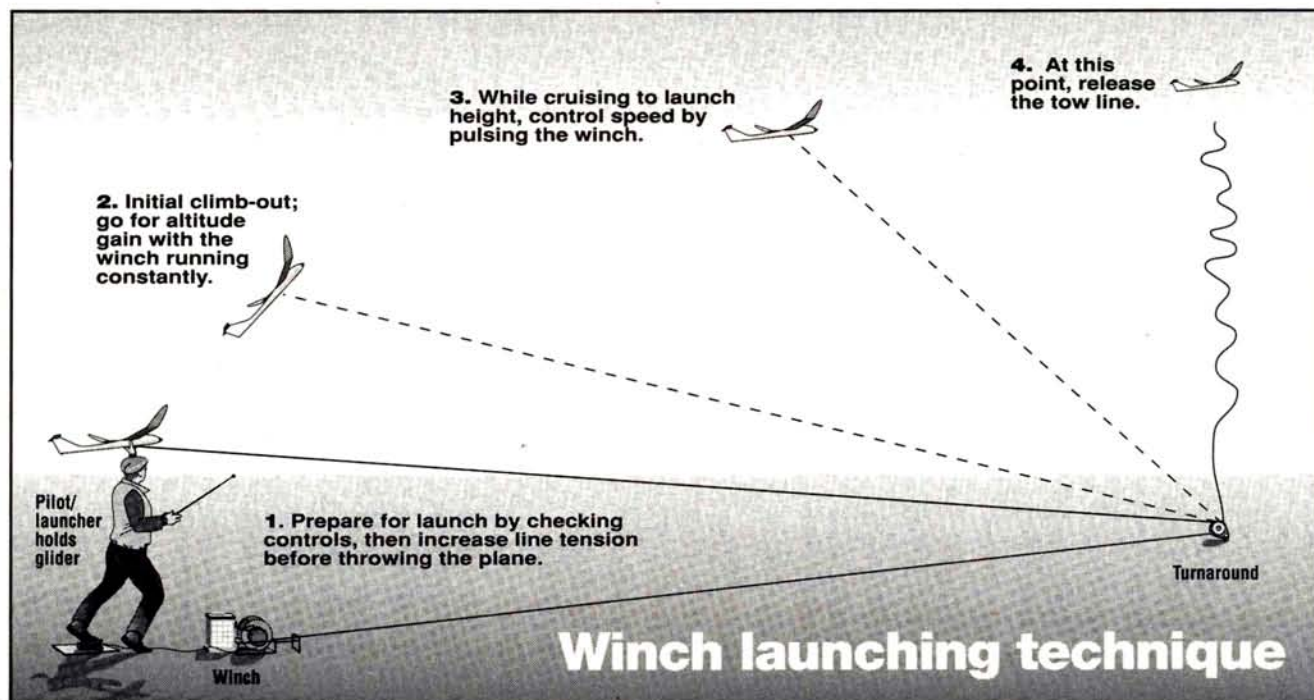
I'm writing this in late winter, and I can't wait for spring and summer. Winter flying is fun, too, but this year, all the nice days have been in the middle of the week. The flying season will be moving in as you read this column. I'd like to hear of any experiences with the designs you're flying, including sport fliers. I enjoy the Eastern Soaring League contest circuit, but sport flying is just as much fun and you don't have any flight-time limits.

WINCH-LAUNCHING TECHNIQUE

Many fliers are afraid of folding their wings during launch. This can be clearly seen by watching new fliers who are just starting to

use the winch. You can see this when they start pulsing the winch almost as soon as they launch. Don't worry about zoom launches; there's plenty to gain by working on the initial phase of your launch. The start is critical to getting good launch height without the fright.

First, you don't have to be *that* worried about your wings on the initial part of the launch, because most of energy from the winch goes into the height gained by your sailplane. You don't build up speed, you gain altitude. Think about all the wing failures you've seen. Most of them occur when the glider is higher and the angle between the winch line and the ground exceeds 45 degrees. The reason is that once you get near launch height, your climb slows and the energy from the winch increases the flight speed, generating more lift and line tension and over-stressing the wings. There are a few other factors that I'll explain later that can unexpectedly increase the stress and cause problems.



ILLUSTRATIONS BY JONATHAN T. KLEIN



Watch the launches of more experienced fliers. The experienced flier will gain altitude quickly at the start of the launch. What's the difference? You start with a tauter line and don't let up on the winch pedal until plenty of altitude has been gained. Now

examine your launch and how much line tension you use at the start. For the next flight, hold on longer and increase tension before you throw your sailplane. Unless you have super-strong wings, you're probably starting to worry about what this crazy idea

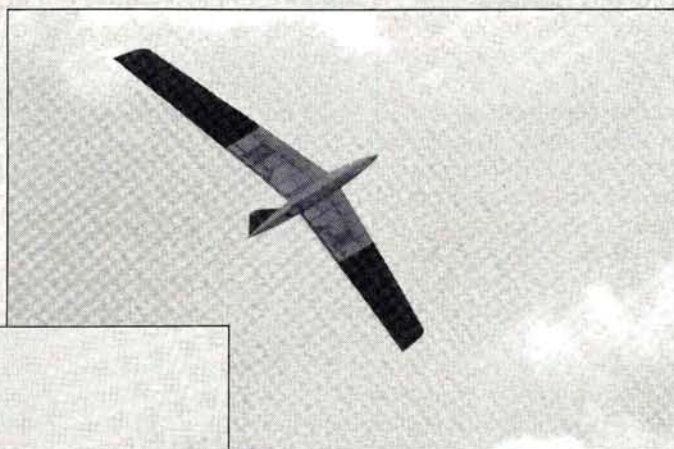
will do to them. As you get comfortable with launching with more tension, try to keep the winch running longer at the start before pulsing. (No, I'm not crazy or getting kickbacks from kit manufacturers who

(Continued on page 48)

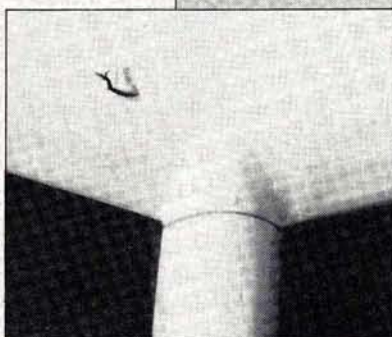
UNFRIENDLY SKIES

I've been asked a few times if hawks have ever attacked any gliders. You bet! I've had some experiences with my Genesis flying wing. One day, I was stretching the mini high-start I use for hand-launch ships and sensed a good thermal downwind. The Genesis flies quickly, and I was able to reach the thermal with plenty of altitude. At first, the Genesis was climbing slowly, but then it "cored" the thermal and started climbing rapidly. Shortly, I was joined by one of the local hawks, who appeared to want to check out this strange new hawk in the area. Instead of just circling, the hawk made a few passes by the Genesis but eventually we both settled into riding the thermal.

The lift was strong and the Genesis was getting small. With all this altitude and lift, I decided to try a few aerobatic maneuvers. By then, the Genesis was high above the hawk and I started a few loops and a roll. This disturbed the hawk a little, but when I went back to circling to regain some altitude so did the hawk. Again, I started to do a few rolls above the hawk, eventually ending up about at the same altitude and then started some loops. The hawk didn't want to have any more of this.



The Genesis flying-wing glider weighs 12.5 ounces, has a wingspan of 59 inches and a wing area of 346 square inches. It's available from Peck Polymers of La Mesa, CA.



Note the talon mark on the canopy area and the hole in the wing covering.

Next thing I knew, the two met in flight, and that sent the Genesis tumbling. I leveled out the ship and the hawk headed off to the west. Luckily, the Genesis was still flying, but it needed a slight trim adjustment. After land-

ing, I found a hole in the covering near the center, a loose fin, and a claw mark in the canopy. I've had midairs with other sailplanes while in thermals, but until that day, never with a hawk. I've repaired the hole in the wing and the fin, but the claw mark in the canopy remains as a reminder. My advice: never do aerobatics in a thermal above a hawk!

(Continued from page 47)

want to sell you a new plane.)

Improper CG and tow-hook positions can reduce your initial height gain. Do you need elevator input during the launch? If you require up-elevator, check your CG position first and then the tow-hook position, because either might be too far forward. A tail-heavy model or a tow hook that's back too far will lead to really exciting launches. When you've adjusted the CG properly and found the correct tow-hook position, you'll need very little control input on the elevator, and your launches will be more consistent.

As you modify your launch style, explore changes to your launch trim for flap-equipped designs. Start by "removing" some flap-launch pre-set. Now that you're flying faster, you won't need all that flap to maintain line tension. More always feels better, but the airfoil efficiency is greater with less flap, and this results in a higher launch.

Here are a few situations that might increase the stress on your wings. When there are plenty of strong thermals around, be a little more reserved on your launches. Launching through a strong thermal can spell disaster for conventional built-up wings. Many of the wing failures seen during last year's AMA Nationals were caused by flying through strong thermals near the turnarounds. The extra lift provided by the thermals, plus the normal launch loads, caused these failures. The winch operators were constantly watching for falling debris!

Another situation requiring care is a windy day, especially if you're downwind of a tree line. You can fly into higher winds after climbing above tree-top height—with unfortunate results.

VMC HIGH-START/ WINCH RETRIEVER

VMC Flight* is building an interesting high-start and winch retriever—certainly not news at this point, but I'm sure you're curious about how well it performs. The

first units were shipped in December '91, and I was able to try the unit that the Millstone Valley Silent Flyers ordered. I also talked to members of a few other clubs that bought the retriever and were trying it.

The quality of the construction is great. The retriever is nicely made and the retriever line is some of the best I've seen. It's so simple to operate that even a junior can easily handle it. It's designed to be foot operated, or you can mount it on a Black & Decker Workmate® if you want to operate it by hand. Many have done that successfully.

The retriever is designed to work with high-starts as well as winches. You might not like the increased drag caused by the retriever. Be careful, especially on your first launches of a large unlimited. You might also be disappointed with the reduction in launch height. If you use a "gorilla" high-start, you'll still have to do some retrieving. There isn't enough power to pull back a very strong high-start all the way, but it does save time and is fine for sport flying.

For use with winches, the line-untwisting

device is nice, but it does increase drag—more than the Davey-style (big-wheel) retrievers commonly used at contests, I think. Retrieval speed is slightly slower, too. The simplicity of operation might help, because you won't need "skilled" retrievers in a contest. If you don't own a retriever and aren't mechanically inclined, I think you'll be pleased with this one. I'm happier launching without a retrieval system. This provides inspiration to find and stay in thermals, and all of us need the exercise anyway.

Please drop me a line if you'd like to see any specific subjects dealt with in this column. Correspondence should be sent to my attention, care of Center on Lift, *Model Airplane News*, 251 Danbury Rd., Wilton, CT 06897. I look forward to hearing from you; see you next month.

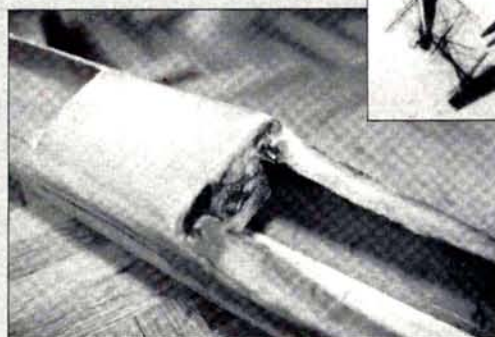
*Here are the addresses of the companies mentioned in this article:
VMC Flight, 18971 Fernbrook Ct., Saratoga, CA 95070; (800) 225-0364; (408) 973-3333.
Composite Structures Technology, P.O. Box 4615, Lancaster, CA 93539; (800) 338-1278.

GRAPHITE FILLER

Composite Structures Technology* makes an interesting carbon-fiber product—Graphite Filler. I've been using it to reinforce composite fuselage joints for bulkheads, wing-bolt mounts and stabilizer mounts. The filler is made of chopped carbon fibers that are about 1/4 inch long. CST suggests that the filler be used to reinforce highly stressed joints and fillets.

Working with the filler is easier than cutting fiberglass or Kevlar® cloth pieces to make reinforcements. When you mix the filler with the epoxy, the epoxy becomes stringy and it looks as if the 1/4-inch fibers are about 3/4 inch long. This mixture is perfect for overlapping the fiber on the bulkhead and the fuselage. Be careful when you start to mix the filler with the epoxy, because it's easy to add too much Graphite Filler, which will just be wasted.

The final test will be a few months of flying. Will the filler hold up better than other methods? If "loose servo trays" describes your landing technique, try this filler and report back on your experiences. The filler costs \$5.95 for 1.25 ounces, and there's plenty of fiber in the jar.



Chopped graphite fiber has been used to reinforce a wing saddle at the former in front of the wing. Inset: fibers are quite small.

I SUPPOSE I shouldn't have been surprised when Tom Atwood asked me if I knew that a readership survey showed 50 percent of *Model Airplane News* readers own computers. Radio-control buffs like to stay on the leading edge of technology.

I had a better answer to his next question: "What can CAD do for model builders?"

Plenty.

"For anybody who designs his own, or bashes kits," I told him, "CAD is the best way to fly."

CAD—Computer Aided Design—allows one to create a drawing, simple or complex, and save it to a disk. From there it can be retrieved for further work or study, major or minor revision or to print out copies as needed. CAD takes a lot less space than a drafting table; floppy disks are easier to store than stacks of drawings; and you don't have to work amid a clutter of drafting instruments, templates, pencil sharpeners and eraser dust.

Wonderful? It sure is, but don't let anybody kid you: CAD is neither faster nor easier than drawing with a pencil along the side of a T-square. There's a bit of uphill learning involved. It's what happens *after* the lines are drawn that makes CAD worthwhile.

ADVANTAGES

When your ideas are taking shape on a drawing board, lines and details get moved around. Every time you erase, the paper gets thinner, rougher and more smeared. By the time your prototype is finished, the drawing is a mess. If you want a decent working drawing, you have to lay vellum or Mylar over it and spend a few hours tracing. Then, if you want a print, you have to run the trace through a Diazo or Xerox machine. If you use CAD, you just punch a few keys and get a cold one out of the fridge while it prints out.

No question about it; CAD does it better. Once your drawing is on disk, you can manipulate it endlessly. You can chop it into sections, blow it up, shrink it down, or print out just a little area of the part you're working on. You can invert, "mirror-image" and add or delete text and details as you wish. And if, as I told you, there's some uphill learning involved, you also

get to coast down the other side. You need to draw details like engines, motors, wheels and servos only once. That's right. Draw the component, save it as a block, and in the future, you'll be able to call it up, insert it anywhere, in any position and in as many places in the drawing as you require.

Best of all, if you want to keep track of where you started and all the changes the design has gone through, you needn't lose your roots in a blur of pencil erasures. You can punch a couple of keys, save a copy of the original file, and go on from there.

can do many wonderful illustrative things, but mechanical drawing isn't one of them.

WHERE TO START

Neither is all that glistens good, useable CAD. If you own a computer, you're on mailing lists, so you know that a lot of bargain software is out there. I've bought a fair amount of it. Some are cleverly put together and actually will perform

a wide range of CAD functions. With care and patience, you can draw almost anything, but none of these, in my opinion, approaches the versatility of the professional programs. Nevertheless, cheap CADs can be fun to explore. They're affordable toys for people

who like to keep looking and hoping that somebody will come up with a \$30 AutoCAD.

But not right now. Not when you're starting out. Your best bet for your C-note is something called ModelCAD.

You can actually design planes (and other stuff) with it. It will run on any IBM-compatible computer with a hard drive, one or two floppy drives, 640K RAM and a mouse. (ModelCAD will tell you you don't need a mouse—but for any real operating speed and convenience, you do.)

Should you buy ModelCAD? Hell, yes!

Do I use it? Hell, no!

Bear with me. I'm not talking out of both sides of my mouth and telling you to throw money away. It's like this: when you were a kid just starting to ride, it made sense to buy a bicycle with training wheels that could be discarded once the basics had been mastered. Same idea. You get a good, safe ride out of ModelCAD's training wheels (pull-down menus). It's easier

to learn, but, unlike the kid's bike, you get *all* your money back when you decide you're ready to move up.

Really.

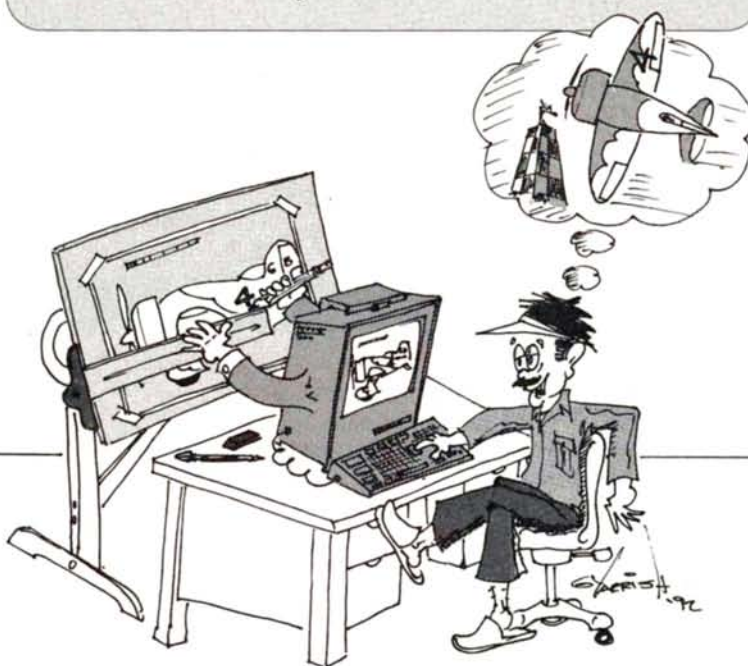
I mean, for 99 American bucks, you can find

PRODUCT REVIEW



For Your Model Designs

by ROY CLOUGH



Is CAD for you? Well, if you're one of the 50 percent who already own computers (and you own an IBM-compatible), you can find out by risking a C-note. But first, a couple of words of caution: don't confuse "drawing" programs, e.g., Paintbrush or MACPaint, with CAD. They

(Continued on page 52)

We review ModelCAD as a starting point

CAD

For Your Model Designs

out if real CAD is for you. If it isn't, well, at least you've had an interesting experience and had a glimpse of how the other half lives. If CAD is for you, you luck out: you get your original \$99 back as a credit when you trade in the training wheels for the full-blown, professional-level DesignCAD 2D. More about that later.

THE MODELCAD PACKAGE

ModelCAD comes in a neat package with an easy-to-follow manual and disks that contain the drawing and print-out program. There are also disks with sample drawings and a "library" containing drawn items that you can lift out and drop into your own work. Most impressive to an R/C fan is a terrific array of airfoil sections that you can retrieve and, if you wish, make thinner or thicker with the Block Scale command before you print them out as exact-size rib patterns by specifying inch output.

Also included in the package is something called "ModelCALC," about which, quite frankly, I have reservations.

ModelCALC allows you to crank in wing area, weight, power and proportions; then it munches your data and displays a brief design critique, which may range from fairly accurate to ludicrous. It will also produce a crude outline drawing that assumes all data refers to a tractor monoplane. The program makes no provision for canards, flying wings, biplanes, or triplanes, nor does it do the more interesting model calculations like figuring stall speeds, power required and all that good stuff. To be charitable, however, it does print out a fairly decent spec sheet.

ModelCAD is easy to install; just follow the directions and supply the information it asks for. Most

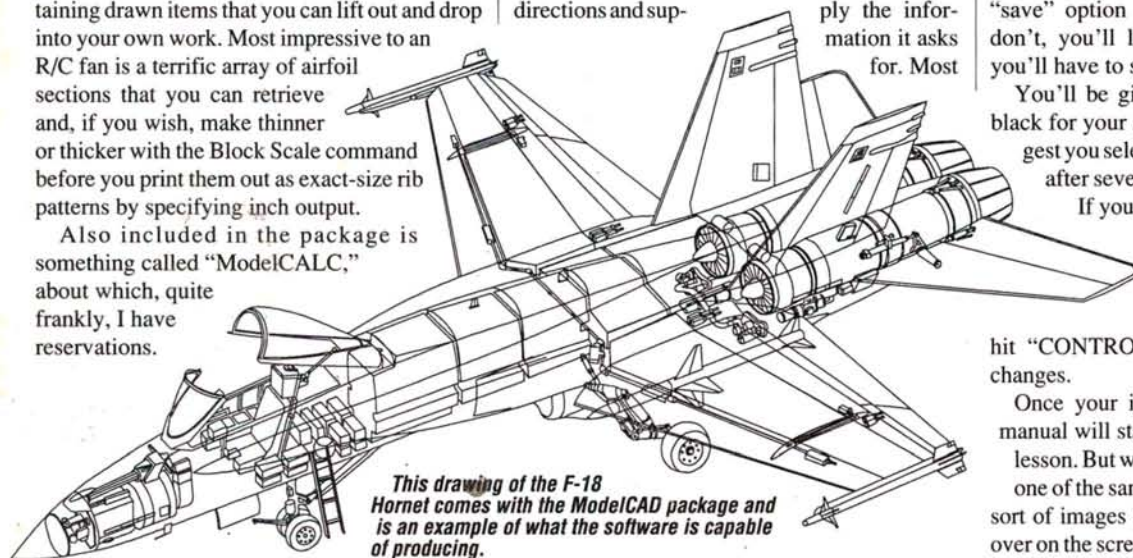
of it is straightforward. You'll need to tell it things like the sort of graphics card you're using, the name of your printer and to which output port it's connected to, the type of mouse or digitizer, etc. Interestingly enough, if you have expanded memory aboard, ModelCAD will find it and allocate any part of it that hasn't been previously assigned to a virtual disk.

If you goof-up the installation, or later want to change something, just run "install" again. You don't have to go through the entire process a second time; just skip over what you don't want to change. Be sure, however, to re-select the "save" option when you've finished. If you don't, you'll lose what you've entered, and you'll have to start over.

You'll be given a choice of blue, gray, or black for your screen background color. I suggest you select black. You'll find it less tiring after several hours in front of the monitor.

If you later decide you want to change your background color, you may not find it easy, because subsequent re-installing doesn't bring up this option. Just hit "CONTROL-F1" to walk it through the changes.

Once your installation has been made, the manual will start right in with the introductory lesson. But wait. Before you go ahead, retrieve one of the sample drawings to get a feel for the sort of images you'll be working with. Look it over on the screen, and then punch F5 and follow



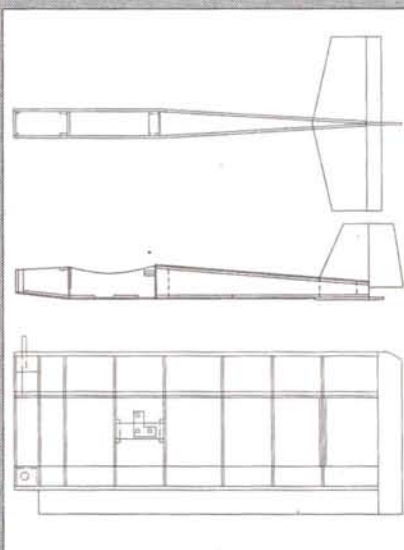
This drawing of the F-18 Hornet comes with the ModelCAD package and is an example of what the software is capable of producing.

REPORT

by STEVE MOTTIN

[Editor's note: to get a second perspective on ModelCAD, we asked Steve Mottin, an avid R/C flier and software/applications engineer, to give us his thoughts on the product. The following is excerpted from his review notes.]

You may select from tens of display modes, including Hercules Monochrome, CGA, EGA, VGA, 8514, PGA and a variety of SVGA modes of up to 1024x768 pixels. If you have a high-resolution video card/monitor combo, I recommend that you call American Small Business Computers* for information regarding specific support.



Steve Mottin drew these plans in ModelCAD for a basic aerobatic trainer.

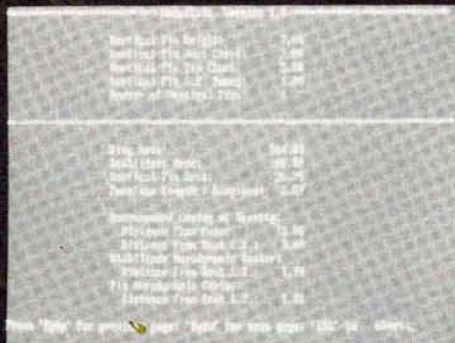
One of the things I was most concerned about before I received the program was in the area of printer support. I assumed that a \$99 program would support only a few top-name printers. I was amazed when the listing went on for page after page. Over 150 printer models are listed for your selection. The manufacturers include Epson, IBM, HP, Panasonic and Tandy. Plotter support includes over 70 models, including products from Houston Instruments, Hewlett Packard and Roland.

A cause for criticism is the manual. It isn't a ring-bound book. The repeated use to which I subjected it caused the binding to fail, and the first few pages are falling out. The program is a lot easier to use than can be quickly understood from a

Reader's



Guillow's Aeronca is shown in ModelCAD.



This shows a sample data-entry screen in ModelCAD.



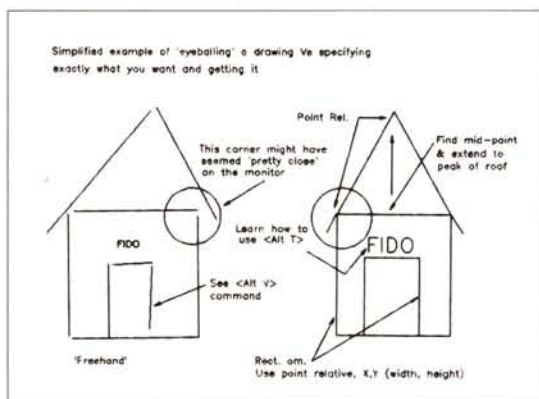
The F-18 as it appears on screen.

instructions to print it out. Try different densities to get an idea of how your printer handles it. Then hang a copy on the wall to look at while you're learning to make drawings of your own.

Learning to use CAD can be an intriguing adventure in extending one's ability to capture and manipulate design ideas, or an exercise in frustration for people who skip over instructions. Read them carefully before you grab the mouse and start shoving it around.

PRECISION

CAD is essentially very precise—far more precise than you can get by eyeballing the cursor against the grid. You can easily prove this. Pick and click a grid intersection, then run the cursor to what looks like an exact number of squares away, click and hit "U." The real distance will come up in a blue box on the screen. Surprised? Read pages 65 through 67. Now repeat the exercise, but set



The doghouse on the left was created by "eyeballing" the image on the monitor while drawing freehand; the one on the right was created by specifying the points that define the image.

your points using the "Point Relative" command. Check with "U," and there you go, right on the money. The same for eyeballed versus specified circles. Set the center point, specify the radius, and watch the circle draw itself.

Look at the two doghouse drawings. The one on the left is freehand; the one on the right is *constructed*. Both look pretty fair, but enlarging ("zooming") shows the difference.

Eyeballing freehand lines won't cut the mustard because what you see on the screen isn't what you get. You're looking at the display capabilities of your monitor, and that's seeing through a glass darkly. Even the best systems show only a rough approximation of the fine-tooth definition contained in CAD. This is why Zoom is provided to enlarge details up to where you can work on them.

STARTING UP

This article is intended as a brief review, not as a lesson in ModelCAD. Nevertheless, I'd like to mention a start-up procedure that works well for model plane design.

Begin by deciding on the size of your drawing. Keep in mind that standard engineering

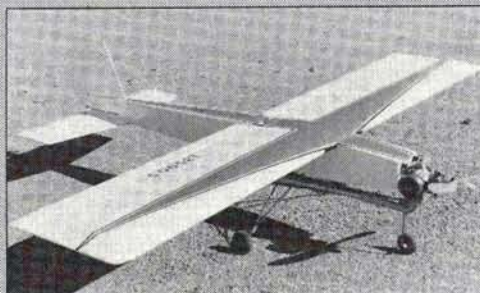
reading of the manual. The most disappointing aspect, however, is the time it takes to complete a print. My computer, a 25MHz 80386-based PC without a math coprocessor, took just over 18 minutes to print the sample F-16 drawing on my Epson FX-286 dot-matrix printer, and longer on my HP Laser Jet IIP printer. I must make it clear, however, that the print quality from both is nothing short of excellent. [Editor's note: Roy Clough, on this subject, notes that this print time is "somewhat irrelevant, in that you don't have to sit there—just walk off and leave it. I usually have other things to do at my workbench while a job is printing out."]

ModelCAD's greatest feature is its extensive command set that allows a variety of "BLOCK" manipu-

lation commands as well as automatic dimensioning. [Editor's note: the current release permits flattening and stretching any of many airfoils available from the software manufacturer, using block-scale commands.] To use automatic dimensioning, simply pick the two points, specify where the text is to be placed and bingo! The item is "dimensioned." The command set is shy in only a few areas—specifically, dragging, filling and line thickness are noticeably absent. Otherwise, the command set can be compared fa-

vorably with CAD programs that cost hundreds and even thousands more than ModelCAD.

ModelCAD certainly performs as a low-cost introduction to CAD and, in spite of its manual, and slow print times, could be quite usable by more patient modelers willing to invest time in its use.



Steve's finished plane produced from ModelCAD plans.

drawing sizes are based on 8 1/2x11 and its multiples: 11x17; 17x22; 22x34; 34x44 (and beyond for "full-size" model plans). Suppose you decide on 17x22. Set points at the top and bottom of the screen and with the "U" command define these as 17 inches. (The length will take care of itself because the ModelCAD screen is longer and narrower than standard paper size.) Pull down the display parameters and set your grid size at 1 inch and your text size at 0.2. The sides of each grid square now measure 1 inch. Set your "snap" size at 1/32 inch (.0312); in effect, this puts ruler markings on your grid.

Drawings should always have a border, and 1/2 inch is standard. Set a point lower left, hit (J), then (*) and enter

(Continued on page 54)

CAD

For Your Model Designs

(21,16). A rectangular border will appear. Keep your drawing within this border. Save the configuration so the drawing will be retrieved as you draw it.

(Note that, had you selected a size other than 17x22, you'd have defined the height of the drawing as larger or smaller, and the grid would be displayed according to drawing size. The 1/2-inch border width would apply in any case.)

Always work within a border. You can use its corners for block handles and retrieval locations. If you want to cut the drawing into panels in advance of the print command, you can use (mid), (alt-D), (alt-B) on the sides to carve it up evenly and save the pieces as separate blocks. Borders are also useful for zooms and figuring the layout, and if your drawing is to be reproduced by somebody else, it will be in standard proportions.

An exception to the border rule is when you're drawing blocks to be saved and moved around within your drawing. For example, an engine drawing is better located with points (handles) on the center line of the crankshaft

than by a frame. Airfoils are best retrieved with points on leading and trailing edges that can be set at the desired angle of incidence.

A COST-EFFECTIVE RULE

If you've read this far, you're probably wondering about a product review that reads more like a sales pitch from a guy who has told you right up front he doesn't use the product himself.

What's involved here?

Well, aside from the training wheels factor, the price. CAD Software, traditionally, has been expensive stuff and not terribly easy to learn. Industrial grade CADs, which do far more than model airplane builders are likely to need, have four-digit price

tags. If this review reads like a puff it's because, in my opinion, you can't get a cheaper exposure to "real" CAD than ModelCAD.

Still, as you begin to master it, you'll probably find times when you wish it had features beyond what you have a reasonable right to expect for \$99 (for example, a zoom window that lets you box in and blow up a particular area; or a hatch command that lets you apply standard cross-section conventions; or "Join" or "Smooth"

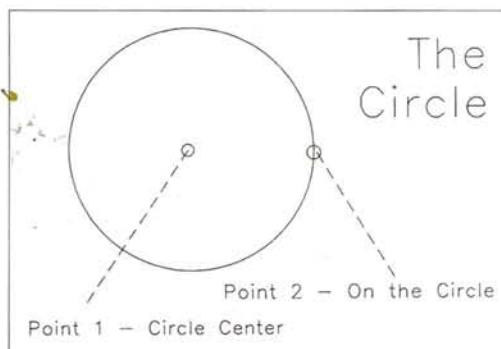
or "TR" commands, which connect line ends, or "EX" to extend or shorten lines or "Fill Wide Lines" or "Parallel Lines," etc.)

Perhaps you'd like a built-in programming language, or the ability to swap commands around

or convert your files to other formats. I need this stuff, and that's why I don't use ModelCAD.

I think many people who get into CAD may go through the same evolution. There will come a time when it becomes necessary to think about moving up. Fortunately, the same people who brought you ModelCAD can accommodate you. They'll take back your used ModelCAD and apply the purchase price toward the full-blown professional DesignCAD 2D, which has all the aforementioned features and more. The best part of this deal is that, though there are some differences and incompatibilities between the two programs, most of what you've learned will be directly applicable. You'll be starting from a firm foothold when you decide to climb higher.

**Here is the address of the company mentioned in this article:*
American Small Business Computers, Inc. 327 S. Mill St., Pryor, OK 74361; (918) 825-4844.



This shows how a circle is formed on ModelCAD: you select points and then press the 'O' key.

If you don't have a computer, should you buy one? Decisions to buy anything usually come as a result of carefully considered need or spur-of-the-moment impulse. With computers, impulse may not be the worst choice: you may find it easier to assess your need if you discover the thing to be indispensable.

Right now is a good time to find out.

Consider that the bottom has dropped out of the home computer market. Warehouses are full of brand-new three- to five-year-old systems in their original boxes. If you're willing to settle for an older system, you can acquire immense computing power for small bucks. From a practical model builders' standpoint, why not? The very latest array of bells and whistles on high-numbered CPU chips may not add up to that much more speed and convenience. Model design is, after all, a rather leisurely, contemplative process. You don't need zero-wait-state response to a 'hmm, let's see,' input.

But don't buy something too old. Don't bother with monochrome monitors or CGA graphics or inadequate RAM, even if somebody tells you it's "expandable." You need at least EGA for decent viewing. More expensive VGA can be better, but VGAs vary a lot in resolution. Don't spring for anything with a dot pitch much over .30. Best bet: make friends with a computer

buff who can steer you through the jungle.

Computer requirements for CAD, as we've been discussing it, are full IBM compatibility, 640K RAM, at least a 20-megabyte hard disk, one and, preferably, two floppy drives and a color monitor with a 128K, 16-color card. Regardless of software claims to work without a mouse, you do need one (or a digitizer) for facile input. Make sure the unit comes with a math co-processor socket, and spend the hundred or so to fill it.

My nameless five-year-old workshop system, which produces the CAD drawings you see with my articles, was assembled with various off-the-shelf components. It's 99-percent IBM compatible EGA with a 14-inch switchable color/monochrome monitor, a 30-meg hard disk, two 5 1/4 floppy drives and 640K RAM, which is plenty if you don't use memory-resident programs. In addition to these basics, I have 2000K of expanded memory (you can live without it), a math co-processor, a modem, a CP/M read-write board (to handle disks from my earlier computers; you don't need it) and a Microsoft mouse. My printer is an Epson LQ1010—the best of the several I tried for CAD. Why? The 24-pin head gives superior print-out definition, and the fixed-ribbon cartridge minimizes smearing. This collection of hardware is protected against line surges by a varistor-diode network between it and the (grounded) wall socket.



After the meet, I was looking through my June 1991 copy of *Model Airplane News*, and there, on page 17, Chris Chianelli's "Air Scoop" column described the answer to my problem: the Champion 45L. A quick call to Hobby Shack confirmed that this ARF pattern airplane had

just arrived and was ready for shipment. UPS delivered mine four days later, and I immediately went to work.

Thunder Tiger has done an excellent job of packaging this plane. Each sub group is packed in its own plastic bag or box so that there's no

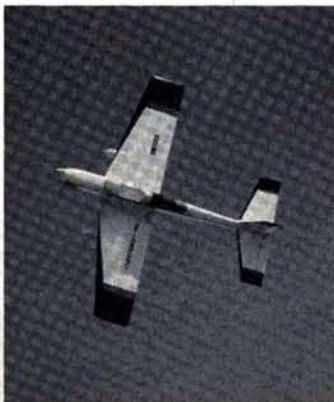
way to damage the parts, short of crushing the whole box.

The kit is complete and includes everything except the engine, the radio, the prop and the adhesives. *Model Airplane News* sent me a new Thunder Tiger Magnum Pro .45 engine (the recommended powerplant). I used 30-minute epoxy for most of the construction. I added a Du-Bro* remote fueling valve and a push/pull rudder system to the plane, but other than that, the kit was built stock.

FLIGHT PERFORMANCE

• Takeoff and landing

I found that with the stock main-gear setup, tracking on the takeoff run was hard to control. This difficulty seems to be true with the other two Champion 45s that are being flown here as well. The solution was to adjust the camber and put some toe-in into the main gear. Once this adjustment had been made, the aircraft tracked as if it were on rails. It still required some right rudder to overcome the engine torque, but rudder response was so good that it could be relaxed as speed increased prior to liftoff. With the Magnum Pro .45, my Champion 45 weighed 5.5 pounds, and the CG was set at 4.5 inches from the leading edge. The long tail moment lets you set the rate of descent smoothly during final approach. The aircraft penetrates well in the wind—a real blessing here in Las Vegas where the wind can come from nowhere at a moment's notice. On the first test day, the wind was zero on takeoff and steady at 25 knots on landing. The first takeoff run was long and smooth with a gentle climb-out. Initial trim required two clicks right aileron and three clicks down-trim. The model was taken to three mistakes high (oops), and flight characteristics were checked. Landings are simple. Just set up on center line; adjust your rate of descent with power; and fly the model down to touchdown. This landing ease greatly reduces stress for sport fliers.



• High-speed performance

The tightly fitting cowl had to be cut out to increase the air flow to the engine. An APC 10x7 prop was bolted on, and off I went. The speed and vertical performance were impressive. The control response was quick and crisp, and tracking was good throughout the Novice pattern. The model seemed to want to kick out at the top of inside loops. This tendency was resolved by changing the engine thrust line from 2 to 4 degrees right thrust. High-speed stalls during high-G maneuvers weren't apparent, and the exits from left and right snap-rolls were very predictable.

• Low-speed performance

At altitude, the model was slowed to stall speed. It had a clean brake, with the nose dropping straight, and usually a slight lowering of the right wing. Flying at high angles of attack and extremely slowly, the model will snap on you, but it's nothing uncontrollable, and the plane recovers very quickly when you apply the power. The generous tail moment was very apparent during slow flight, as the rudder was very effective in maintaining heading. Then the engine flamed-out, and I was faced with a dead-stick landing on my first flight! Another pleasant surprise was that this model loves to glide. I had no trouble penetrating the stiff wind, and I made it back to the landing area easily. Touchdown was smooth with only a small bounce.

• Aerobatics

I shot the pictures for this review at the Circus Circus flying field as Frank Kelly—a superior pattern pilot—flew the plane. He told me that this is a fine entry-level pattern aircraft capable of flying the Sportsman pattern and higher classes with little effort. It tracks straight and true, and has very good vertical performance. This model is very stable in pitch and roll axis, and the control response is very crisp, but it needs a lot more rudder deflection than that recommended for initial setup to hold knife-edge flight. The model wants to nose over, and there just isn't enough rudder throw to hold the line. With the .45 engine, it will do all but the most demanding vertical maneuvers, and do them well.

CONSTRUCTION

The actual construction wasn't difficult. I read the 17-page manual a couple of times to be sure that I wasn't missing anything, and to match all of the parts with the detailed photo/parts lists. It was here that I discovered the first error. The dihedral measurement on page 4 has the engineer's arrows drawn, but the actual distance is missing. I measured the dihedral joiner angle and, using that measurement and past knowledge, I came out with about 1/2 inch under the wing tip.

The only other item that might cause some misunderstanding is the wing-mounting block. It was shipped in a parts bag and wasn't on any of the parts lists, but it was shown already installed in the photo manual. This might confuse someone with less building experience.

After I had finished checking all the parts, I was ready to start. Total construction time was about 10 hours, and I worked a couple of hours each night. The plane goes together very quickly, and it will come out straight as long as you don't put any twists in the wing when you attach it. The wing joiners fit tightly!

This kit has a unique feature that was new to me: a soft engine mount! You mount it on the backplate of the Pro .45, and it's fully adjustable for thrust. When you attach the control surfaces, make sure that you pin the hinges (as shown). With a little care, I was able to drill through the control surfaces from the bottom without going through the top covering. I made every effort to maintain the beautiful finish of the top surfaces.

The Champion 45 comes with a clear canopy that really fits! It also has a plastic cowl that has scribed lines for the engine cylinder head and the muffler. This cowl fits the Magnum Pro .45 like a glove. Indeed, the cowl fits so well that it can be a real hassle trying to get fuel lines off and on to fill the tank, so I decided to use a refueling valve. I hate wheel pants, but the set that came with the kit is easy to install, and the pants look sharp on the finished aircraft.

After four or five flights, the wheel pants and the cowl proved to be too thin to take the strain of repeated vibrations; they cracked and split. If you want them to last, you must line them with fiberglass cloth. I also had trouble with the soft landing-gear legs: they flexed on hard landings,

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713	OPERATION BACKFIRE, V2 ROCKET	40 min.
691	FLYING CADETS, Ryan STA's & AT-6	40 min.
730	STUNT PILOT, Tailspin Tommy, Feature	60 min.
731	SKY PATROL, Tailspin Tommy, Feature	60 min.

THE THIRD REICH, B/W VIDEOS

725	THIS IS YOUR ENEMY, Graphic	60 min.
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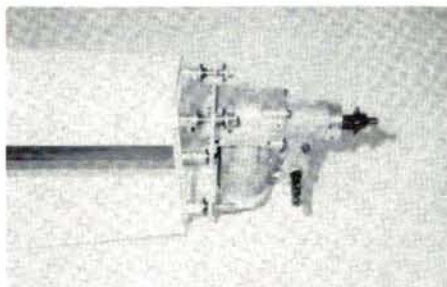
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Champion 45L



As you can see, the plane is mostly factory-built.



Adjusting thrust deflection is a snap.

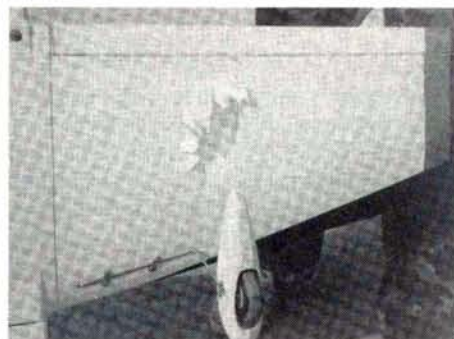
and this caused the wheel pants to punch holes in the wings.

I was lucky that on the third flight, I noticed that the left plastic wing tip was binding the aileron. When I looked more closely, I saw that the tips weren't glued on, but were held in place with a thin piece of trim tape. It wasn't difficult to remove the tape and glue the tips securely into place. Two other Champions that I know of have lost their wing tips while airborne, so I advise you to glue them on. Basically, anyone who has built almost any type of R/C model aircraft shouldn't encounter problems building the Champion.

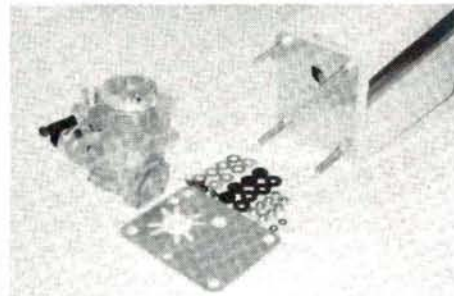
FLYING

When I was ready to fly, I ran 32 ounces of fuel through the Pro .45 to ensure a good break-in and to set the idle. This engine is a reliable powerplant! It has lots of power and is easy to start and to maintain.

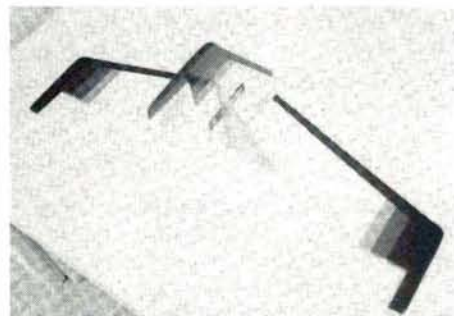
How has my Champion fared in competition? Recently, there was a local fun-fly contest at which I had planned to fly only a couple of trim flights, but the guys talked me into signing up. The events were: takeoff and complete an inside loop; go under a 5-foot limbo three times, against the clock; takeoff, climb, spin as many times as possible in 2 minutes, land and adjust the idle for the lowest possible setting; and takeoff and climb for 15 seconds, cut the engine and glide



A particularly hard landing caused this wheel pant to puncture the wing.



The Magnum Pro .45 is the recommended engine for this kit, which includes an adjustable soft-mount system.



It's easy to ensure that the vertical and horizontal stabilizers are square.

for as long as possible to a spot-landing. Out of 18 contestants flying a variety of sport aircraft, I finished fifth using the Champion 45L.

The greatest challenge was the glide to a spot landing. By the time that event was flown, there was a 10- to 15mph, 75-degree crosswind. Most of the competitors had trouble penetrating the wind dead-stick and hitting the spot, but the 45L really showed its stuff. I had the best landing at less than 3 feet, which wasn't too bad, considering that I didn't even plan to compete. Although it was designed as a pattern plane, the model has proven to be a good sport plane as well.

*Here are the addresses of the companies mentioned in this article:

Thunder Tiger; distributed by Global Hobby Distributors, 10725 Ellis Ave., Fountain Valley, CA 92728.
Magnum; distributed by Global Hobby Distributors.
Du-Bro Products, 480 Bonner Rd., Wauconda, IL 60084.

APC; distributed by Landing Products, P.O. Box 938, Knights Landing, CA 95645.

HOW TO

Blades and Preparation

heli tips on
weight and
balance

by A.E. STANLEY

WHEN IT COMES to building—and, sometimes, rebuilding—helicopters, the preparation and finishing of the main rotor blades seems to be a wide-open area. The methods used range from the simple to the obsessive and, as a pilot, you must decide how involved you want to become with making your own blades.

The easiest method, by far, is to buy finished, ready-to-bolt-on blades. They can,

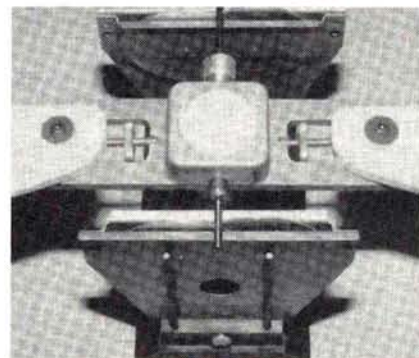
whether there's a number pencilled on it. This is its weight in grams. (The blades usually weigh almost the same.)

WEIGHT AND BALANCE

First, put the blades on a balance to double-check their weights. If there's a substantial weight difference, mark the heavy blade and make a note of the difference. Next, lightly sand the blades and check each for its spanwise center of gravity (CG).

There are several ways to check the CG, but I prefer to use a straight-edged razor mounted in a vise. This method is very easy and very accurate. When you mount the razor blade, be sure that it's level. Set one main blade (lower side

down) on the razor, and let it rest there at a 45-degree angle. Move the blade back and forth on the razor until it balances (it will remain so only for a second or two), and then press down on it slightly to mark it. After you've marked the first spot, turn the blade 90 degrees and repeat the process. Highlight the "cross-hair" marks created on the blades with a pencil so that they'll be visible through the covering. Follow the same steps with the second blade, and then compare the two. Measure from the blade bolt outward and from the leading edge inward.



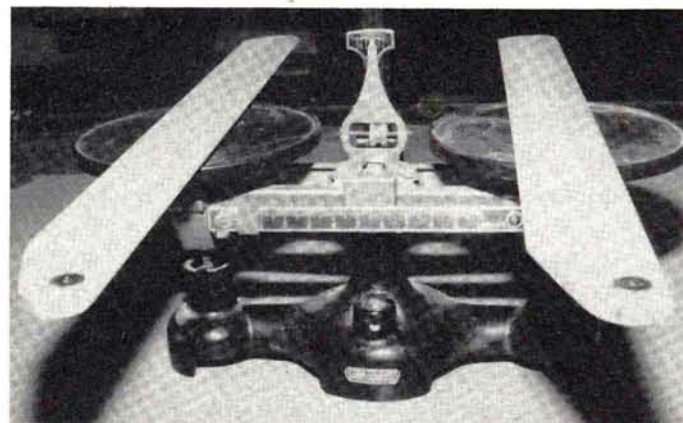
I like to check the final balance using a Semco balance mounted on the High Point. Note the bubble in the center of the tool.

Here's where things become time consuming. Any weight or CG difference between the blades must be eliminated. Do this using lead weights. If, for example, one blade weighs more than the other but the CG is identical for both, reduce the amount of lead used on the heavy blade until the weight of each blade is the same. Next, loosely install the lead weights in the slots in the

(Continued on page 64)



Rest the blade on the razor, and gently move it back and forth until it's balanced. When the blade has been balanced, mark its center by pressing down on it.



Check the balance of the blades before you begin. (This balance was found at a yard sale. You can buy a new one from a scientific-products supplier.)

however, cost a lot of money, especially if you're a beginner, because tail strikes and tip-overs will be common occurrences. If you don't have an unlimited helicopter budget (call me if you do!), you'll have to make your own blades.

To get a good final product, you must begin with a set of high-quality blades, and the best place to find one is at your local hobby shop. There, you'll be able to "sight" each blade and ensure that it's straight.

I use pre-slotted blades, which often come with weights. I check each blade to see

Blades and Preparation



Be sure that all the pushrods are attached to the head when you balance it.

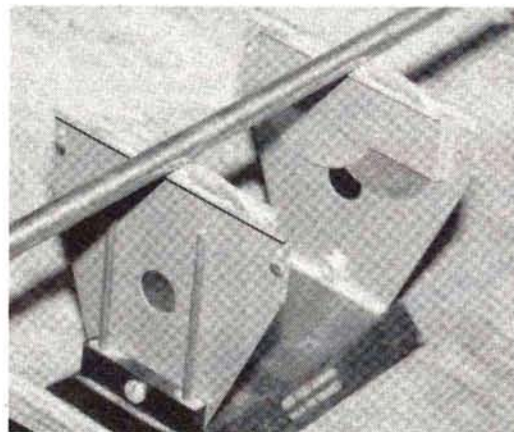
blades. Put the blades on the razor (with the weight slot up), and slide the weights in the slots until the blades have identical CGs. After you've achieved the same CG, you can epoxy the weights in place. When the epoxy has dried, sand it flush to match the blade.

COVERINGS

There are several blade-covering materials, the three most common being shrink-wrap, adhesive-backed covering and paint. There are a few things you must do before you cover the blades. Wipe them with a tack rag, and then apply a couple of coats of Balsarite*. It will enable the covering to stick to the blades better, and it also will help to waterproof them. (When painting the blades, Balsarite isn't needed.) Take your time covering the blades, and be sure to work out all the bubbles and creases as you go.

FINAL BALANCING

You need a way to balance the blades and the rotor head at the same time. I use a High



The High Point balancer and the Yale 20-inch shaft are the "backbones" of the balancing process.

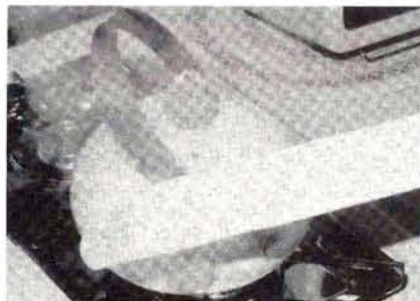
Point* balancer and a Yale Hobby Mfg.* 20-inch balancing shaft. I mount the blades on the head and make sure they point straight out. Then, to straighten them, I mount them on the helicopter and run it up to just before hover. I let the head wind down, and I mount it on the balancing shaft.

With the blades and the shaft on the High Point balancer, set the blades at the 12- and 6-o'clock positions. If balanced correctly, they'll remain in this position. If they move, you must adjust the weights on the flybar. (I do this using wheel collars.) Next, move the blades to the 3- and 9-o'clock positions.

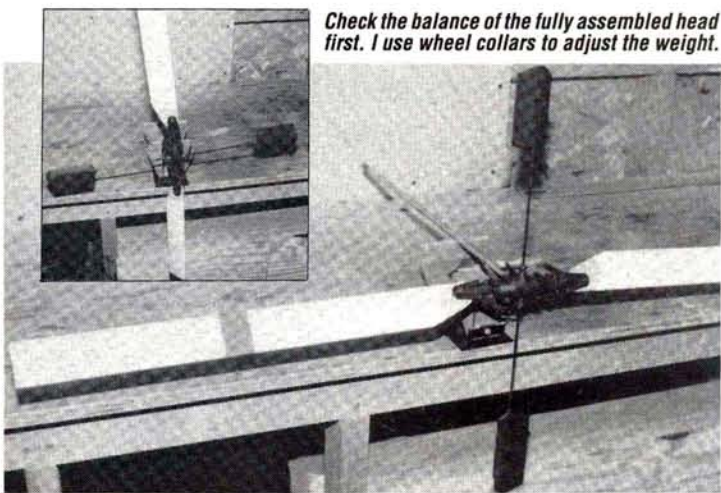
Once again, the idea is for the blades to remain in this position. If they need to be balanced, add weight to the lightest one. There are many ways to do this. I use tape so that I can see the difference in the blades when I track them later.

Many pilots use colored tape to balance the blades and to track them. The only problem is that they usually apply it to the end of the blade, and this changes the CG and defeats all the earlier work. If you put the tape on the CG (you can see it through the covering because of the pencil marks you made earlier), you'll increase the blade's weight without moving the CG closer to the end.

One other note about balancing using the High Point balancer. Keep in mind that you aren't balancing a flybar and two blades; you're balancing a disk. Picture your machine in the air. What you see is a disk—not two blades. The imbalance may not fall on the line of the flybar or the line of the



By far the easiest way to cover blades is with shrink-wrap. Start shrinking at the root and work your way along the blade. Be sure to pull the shrink-wrap tight at the end.



Check the balance of the fully assembled head first. I use wheel collars to adjust the weight.

This is what your blades should look like when they've been balanced. Note that the tape is on the center of blade instead of its end. In this position, the tape won't throw the CG off.

blades. It usually falls on some other part of the disk, so you may have to add weight to a blade and adjust the flybar's weight. Take your time, and don't let all the work get you down; it takes practice to get it right. When you've finished, the blades should stay in any position you put them on the High Point.

Like any part on your helicopter, if you take your time and double-check everything, your blades will perform well and cause no vibration in your machine. Happy flying!

*Here are the addresses of the companies mentioned in this article:

Balsarite; distributed by Coverite, 420 Babylon Rd., Horsham, PA 19044.

High Point Products, distributed by Robart Mfg., P.O. Box 1247, 310 N. 5th St., St. Charles, IL 60174.

Yale Hobby Mfg., Kings Hwy. Industrial Park, 7324 Commercial Cir., Fort Pierce, FL 34951.



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Byron Originals* released its version of the P-51 many years ago. Since then, they've sold hundreds of the good-looking airplane to modelers who sought an alternative to cutting and gluing a stack of balsa wood. Byron's 51 featured a fiberglass fuselage with molded-foam wings and tail feathers. Though the design deviates from exact scale wherever the engineers thought it was necessary, there's absolutely no mistake that this is a P-51. Only North American might argue otherwise!

The original model had a few flaws that Byron chose to correct. One of the more serious was the landing-gear system—its inherent weakness and complexity. But, in the air, in the hands of a capable pilot like, say, Garland Hamilton, you couldn't find a more impressive aircraft. Enhancements for Byron's new Mustang include a fiberglass wing center section that's now molded to the fuselage, replacing the old foam center section; a molded and keyed landing-gear mounting system that accepts a lot more abuse; and some very neat instruction diagrams. We definitely have an improvement here!

(Continued on page 71)

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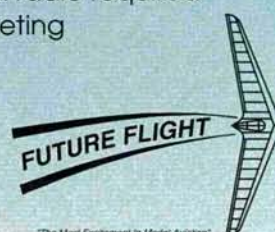
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AEROBATICS

(Continued from page 18)

maintain a straight track. In a crosswind take-off, it's important to use the rudder to correct the heading as well.

PRACTICE

If the wind is from the left during takeoff, you'll have to apply left aileron and right rudder during the takeoff. Then, as speed builds up, you'll need less rudder until you reach the point (during climb-out) at which you'll need just enough right rudder to counteract torque. Practice makes perfect, and every plane is different. It isn't unusual to find me at the airfield just practicing takeoffs and landings instead of the usual aerobatics. Knowing what to do ahead of time will really help you with those crosswind takeoffs. Don't be intimidated. With the proper skills, it's amazing how strong a crosswind you'll be able to handle. Next month, we'll look at crosswind landings.

FALL FESTIVAL

(Continued from page 44)

creation uses a Kmart flowerpot as a shroud. The model flies very well and, when Cecil isn't flying it, he uses the shroud to grow petunias! (Only kidding, Cecil!)

(Continued on page 74)



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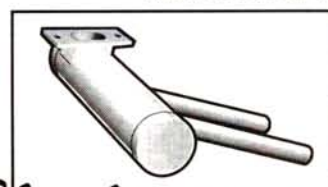


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Previous page: powered by a Quadra 42 with a reduction drive, Richard Heinz's 24.5-pound Byron P-51 comes in on a landing approach at the 1991 Byron Aviation Expo. ■ Above left: retired Brigadier General Reg Urschler offered rides for a fee in this Confederate Air Force "Gunfighter" P-51D at the 1991 Byron Aviation Expo. Built in March '45, the stock North American-built fighter is one of only 80 to 100 D models still flying. ■ Above right: Lynn Jorgensen's Byron P-51 is powered by a 4.2 Sachs that spins a four-blade Byron prop and weighs 28 pounds. The plane is a scale miniature of the Confederate Air Force's Gunfighter P-51.

THE GOOD

Since you more or less assemble this kit, there's no need for full-size drawings. This is good because the method sheets or schematic drawings can be taped to your wall, hung from your bulletin board, or just laid on the bench for reference as you follow the step-by-step directions. Another plus is that, in all cases but a couple, the parts fit was perfect. Exploded views are large and easy to read, and they clearly show the exact placement of all parts. The 20-page instruction manual is loaded with photos, a three-view drawing and several well drawn diagrams showing how to handle certain steps of construction.

The kit comes with two ball drivers, an awl and a 40-inch piece of fiberglass cloth. There's quite a list of things that aren't included with the kit, and you'll need to get them before you attempt to construct this magnificent airplane. For example, you'll probably opt for Byron's retracting main-gear package (no. 6030731). Also, if you'd like to protect the rear, lower fuselage and the bottom of the rudder from scratches and scrapes, I strongly suggest that you get the retracting tail-wheel option (no.

6030740). And it might not be a bad idea to buy some wheels and tires for those main-gear axles to sit on. Ordering part no. 6030237 will get you one 5 1/4-inch, scale-looking, block treaded tire and hub. But, while you're at it, better order two! If the retract idea makes as much sense to you as it did to me, be sure to order the wheel strut covers/sequencing gear-door assembly (no. 6030733), as well as part no. 6030735, which is

"IF I WERE AN AIRPLANE CRITIC, I'D AWARD THE NEW BYRON P-51D MUSTANG THREE-AND-THREE-QUARTER STARS FOR HOW EASY IT IS TO BUILD AND A FULL FOUR STARS FOR THE WAY IT FLIES. IT DOESN'T GET MUCH BETTER THAN THAT!"

the pneumatic support equipment that makes everything work in unison.

Naturally, you have to dig up your own radio and decide which engine you want. Byron offers a choice of two Quadra powerplants. One uses the Quadra 42 with a reduction drive system and a large, but not scale, four-blade prop, and the other choice is a Quadra 52S hooked to Byron's fabulous, ultra-quiet PurrrPow'r system. I learned about power from my drag-racing days when we

were taught that there's really no substitute for cubic inches, so I opted for the Quadra 52S for more horsepower.

More goodness comes from the way that the entire radio system is installed. I like the molded-glass center section being attached to the fuselage because it offers a great place to put all but the aileron servos. Access to these servos is through the opening afforded to you when you take advantage of the removeable cockpit/canopy section. Other extras include a very nice set of Mylar markings of the "stickem" variety.

Since all the panel lines are already molded-in on the fiberglass sections, the builder has only the outer wing panels and stabilizer to

contend with. The molded-foam parts are easy to work with, but a big hunk of foam rubber is a great addition to your workbench if you'd like to get through the building with a minimum of dings and dents. For optimum results and a longer-lasting model, I strongly urge you to choose the fiberglass covering method for the foam parts rather than the light, Mylar, heat-shrink stuff. The fiberglass is much, much stronger and allows a wider variety of finishing

SPECIFICATIONS

Model name: P-51D Mustang
Type: Scale WW II fighter
Wingspan: 85 inches
Weight: 28 pounds
Length: 76 inches
No. of channels required: 6 (aileron, rudder, elevator, throttle, flaps, landing gear)
Radio used: Airtronics
Airfoil type: Semisymmetrical
Manufacturer: Byron
List price: Basic kit—\$475.95; as tested—\$1,339.95
Wing area: 1,086 square inches
Wing loading: 58 ounces per square foot

Engine: Quadra 52S PurrrPow'r
Power rec'd: Four-blade reduction drive with Quadra 42, or PurrrPow'r with Quadra 50
Prop: Dynathrust 20x8
Washout built-in?: No
Wing construction: Foam panels bolted to fiberglass core
Kit construction: Fiberglass and foam; some wooden parts
Accessories: Retracts, flaps (you must use)
Features: all the hardware needed to build this kit is in the box or in one of the several accessory packages you may buy (like landing gear!).

Hits

- Nice glass work; accurate injected-foam parts.
- Good instructions; most parts fit perfectly.
- Very impressive when carefully finished.

Misses

- Fuselage formers: a couple must be slightly reshaped to fit properly.
- Landing gear is stronger on "new" version, but still weak torsionally.
- Plane is nose-heavy; will nose-over if not corrected with tail weight.

P-51D

Total cost of review P-51D

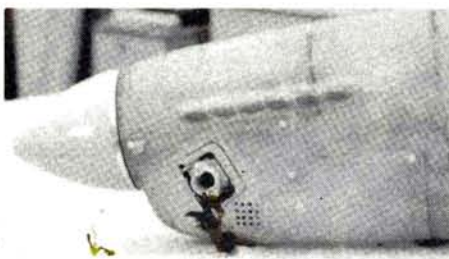
P-51D Kit	\$475.95
Main-gear retracts	248.95
Gear-door assembly	40.00
Pneumatic support kit	49.95
Two main tires	33.00
Retract tail wheel	42.70
Quadra 52S engine*	449.00
	\$1,339.55

*including PurrrPow'r motor mount

P-51D

materials to be used. Denny DeWeese helped me quite a bit with the Mustang project and did a fabulous job of glassing the Byron foam parts with 2-ounce cloth, Dan Parson's* 6/10-ounce cloth and Pacer's* Z-Poxy finishing resin. Remember that epoxy/glass surfaces tend to cure and shrink over a long period, so don't be in a hurry to paint when you've finished glassing. Give the airframe a rest for several days; that way, any areas that have shrunk or caved in a little can be filled and sanded.

Another bonus of building the Byron P-51 is that you don't need any special tools or adhesives. Of course, I use only Zap* and Z-Poxy adhesives, as does Byron, but your favorite brands may work just as well. You'll need some five- and 30-minute E-Poxy, one package of Z-Poxy Finishing Resin for glassing, a bottle of



The Quadra 52 carburetor is visible in this side view of the Mustang's nose.

hours. Finish-sanding, priming and painting should take another 20 hours or so—pretty quick for a kit of this size. That's because you're really not building a kit as we know it, you're assem-

"ON A GRASS FIELD, THE P-51 WAS AIRBORNE IN ABOUT 100 FEET AND CLIMBED OUT EFFORTLESSLY... THE AIRPLANE IS AS FULLY AEROBATIC AS ITS FULL-SCALE COUNTERPART."

your favorite white glue, several sanding blocks and assorted grits of sandpaper, a good thread-locking compound and most of the tools you already have hanging around the workshop.

I'll assume that anybody who buys a Byron Mustang has some kit-building experience and is familiar with the multitude of terms used in

bling sub-structures into a final form. The only wooden parts in the kit are those used for the wing center section, a few reinforcing formers for the stab and wing areas, aileron and flap shrouds and engine-mounting bulkheads. The fuselage comes to you in two parts and is joined along a marked, indented seam when called for.

GLITCHES

Kits of scale models often have little glitches. Some can be lived with; some have to be corrected. In the case of the Byron P-51, I found several, but none is life threatening. For example, the instruction booklet often shows a picture to help you along, but the picture doesn't always belong with that step number. Page 6 has us remove both the cockpit floor area and the wheel-well area fiberglass with a Dremel tool. This is fine, but the picture clearly shows the fuselage front and rear pieces joined when, at this stage, they aren't. Also, there's no mention, at this time in the instruction booklet, that we're supposed to keep the cut-out part of wheel-well fiberglass for use later on. So, don't throw it away! On page 7, Step 6 has us trial-fitting and gluing the aluminum spars into place. The final sentence reminds us to ensure that we've sanded the aluminum before we glue it. I think that the beginning of the wing construction should emphasize that point.

When you install the plywood ribs for the landing-gear mounts, you must check that the parts are equidistant from the fuselage center line. My kit had a mere 1/8-inch difference, but this is important to recognize if you expect the landing gear to fit properly later on. I had a difference in wing thickness also. At the point where the outboard panels are plugged into the main structure, the left panel was 5/8 inch thick

while the right panel was only 1/2 inch thick. This 1/16-inch difference on the top and bottom of the panels is dealt with by filling and sanding ply-end caps that are attached to the root end of the wing panels (a method used in many Byron kits). Before installing the aluminum spars, it's a good idea to bevel the corners and edges slightly to make them slip into their respective channels a lot more easily. In my case, the ailerons were exactly 1/8 inch too long and had to be trimmed. If you find this in one of your kits, it's most important to cut the structure with a brand-new X-Acto, fine-toothed-saw blade.

On page 8, there are several steps to installing the ailerons.

Step 22 calls for a 3/32-inch-diameter hole to be drilled to accept a threaded rod. Because the rod's diameter is 0.109, and a 3/32 drill bit's diameter is 0.093 inch, use a 7/64-inch-diameter bit. Also, once in a while, the directions call for some minor pieces that aren't in the box.

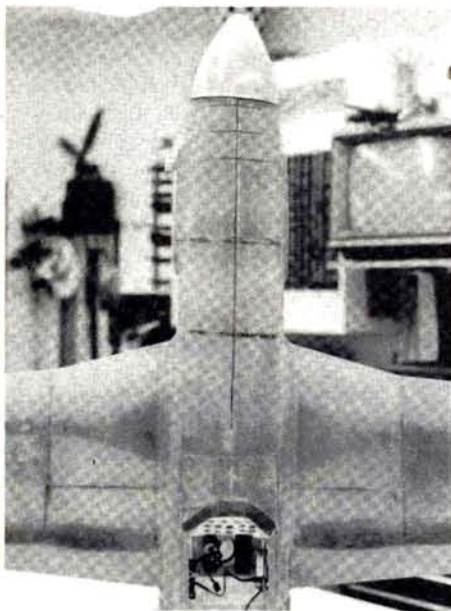
Step 28 on page 8 calls for some 1/4-inch dowel. There isn't any. Another small goof is on page 14: Step 9 calls for drilling 3/16-inch holes in a plywood spar. These holes must be 7/32 inch, or you'll be angry later on! Another slight error exists when the instructions call for drilling a hole in the leading edge of the flap exactly 3/4 inch in from the end. If you do this, the servo arm won't line up on the same arc/plane as the threaded ball that will be put into this hole. Drill the hole 17/16 inches from the end, and everything will line up properly. See, I told you there were only a few little glitches, and they're certainly easy to fix!

FURTHER REFLECTIONS

The overall quality of this airplane really is excellent. The fiberglass work and parts fit simply can't be faulted, but there were a few areas that should be corrected. All were "fixable," but some took extra time and materials to make them right. First, parts 14—the plywood outboard hinge covers—are die-cut too short. This might not seem too important, but you have to fill a gap or replace the piece of wood to make it fit properly. I had to grind, file and sand the rear of the PurrPow'r muffler before it would fit into its place in the fuselage. A call to Bruce Godberson at Byron assured me that this was unique to my airplane and that others had plenty of clearance.

The landing gear is certainly a work of art. Byron uses an 8/32 socket-head bolt to hold the gear leg in adjustment. In my opinion, the leg should be pinned into place by drilling and tapping a hole for a bolt to ensure that nothing moves after installation. One area of this kit that left something to be desired was the die-cutting. Almost every piece of wood had to be hand-cut out of the plywood sheets. This was the only thing I found annoying in the entire kit.

Other suggestions come from Frank Tiano,



Right thrust can be seen clearly in this view of the spinner poised on the upright fuselage. Note that the exhaust stacks are aligned with the spinner backplate.

model aeronautics. It will be kind of hard to build an airplane if you think a stabilizer is something they put in swimming pools to kill bacteria! With that assumption made, I guess/predict that this kit can be assembled in about 80

the scale modeler, and they don't necessarily reflect a mistake on the part of Byron. For instance, I got a little "bent" after cutting out a scribed area of the nose fiberglass to make clearance for the recommended Q52's carb only to find out later that it had been scribed in the wrong place, so I had filling work to do.

Also, I don't agree that this aircraft needs more than 1/2 inch of thrust offset. The spinner sits on the Mustang's nose at such an angle that, for several moments, I thought something was wrong. Evidently, way back when Byron's engineers developed the kit, they thought that a four-blade power system required this enormous offset or right thrust to make the airplane track properly during takeoff.

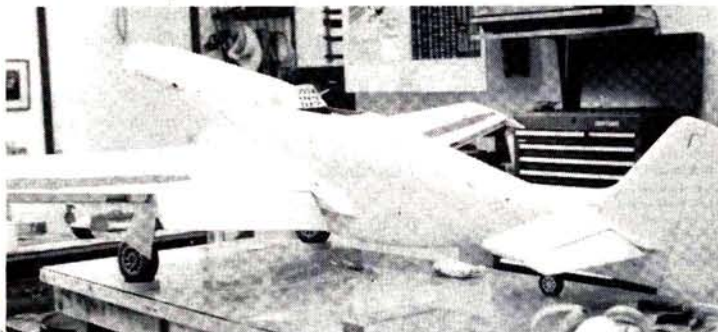
Denis and I removed about half of this offset and have found no ill effects to date. Whoever did the mold work for Byron measured back an equal distance from each side of the nose ring and put the exhaust stacks right there. The problem is

that, with 1/2 inch of right thrust built into the end of the nose, one exhaust stack is slightly in front of the other. This becomes a real pain in the tush for the scale buff when it's time to paint a band of squadron color around the nose. No matter what you do, the band will look slightly crooked from above. The exhaust stacks should have been positioned the same distance away from the leading edge of the wing-saddle opening; I think they'd look pleasing. If you opt for the four-blade power system, be warned that the spinner shape on that spinner is substantially different from the one used for a regular, two-blade system. The four-blade spinner isn't the proper shape for scale contest work. The regular spinner is very close to scale. These minor "bugs" certainly aren't enough to deter me from buying another Byron kit.

GET READY

The Mustang is constructed in a way that allows you to install your radio system as you go. Only the semi-exposed aileron servos have to be installed after painting. I use an Airtronics* radio because they have a reputation for being virtually glitch-free. A standard servo is used on throttle; heavy-duty ones are used on flaps, ailerons and elevators; and a special Byron 180-degree retract servo is used for the sequencing landing gear and inner door system. The canopy pops off to reveal the entire retract and radio system. Not too bad to work on!

The Mustang will weigh in at around 24 to 28 pounds, depending on your glassing technique, how well you sand off most of that heavy primer and which engine you use. There's no doubt in my mind that this airplane will fly with a Webra* Bully 3500, or the new O.S.* 3500. I'm positive that the new Super Tigre* 4500 would also provide outstanding performance. I also think that the recommended Quadra 52 on direct drive offers the best all-around performance and sound. And since the instructions show the installation of the Quadra 52, I figured, "Why try to reinvent the wheel?" The 52 is very user-friendly and capable of producing some serious horsepower. It fits into the nose of the P-51 pretty neatly; only



The model has been primed; the flaps have been installed.

the carb and the spark-plug lead hang outside the fuselage walls.

Byron's engine-mounting system borders on the ingenious. Aluminum brackets are fastened to 1/8-inch-thick plywood bulkheads in such a way that they allow the rear of the assembled PurrPow'r muffler/engine combination to slip into them. Another aluminum bracket in the front of the engine bay captures the front part of the Quadra. Both aluminum brackets are simply tightened up with socket-head bolts.

FINISHING TOUCHES

As I mentioned earlier, I suggest that you cover this airplane with fiberglass cloth, not plastic film. The Mustang will hang around much longer if you take my suggestion. The fiberglass work on my kit was nothing less than outstanding. I don't remember even one pinhole and wouldn't have been upset if I had found a few; but having none at all was unbelievable!

You must prepare the fiberglass properly before you prime it. Wash with warm, soapy water, wipe with lacquer thinner, sand lightly with wet 320-grit sandpaper, mask off all the areas you want to keep overspray off, and start priming. Wet-sand and apply your color coats and then your national insignias. When you think you've finished, you haven't! You absolutely must get a good-looking pilot bust from MGA Enterprises*. I chose the USAAF ver-

(Continued on page 81)

FLIGHT PERFORMANCE

• Takeoff and landing

As long as you have plenty of right rudder available, the P-51D will track straight. Ground handling is excellent, and the model breaks ground with an impressive grace and elegance—totally majestic! Pulling up the gear really cleans up the model aerodynamically, and that obviously improves tracking and overall performance; so, the sooner the better. The model is good at establishing a predictable rate of descent on final, especially when the flaps are deployed, and when they are deployed, sufficient power must be maintained to overcome the increased drag and ensure a safe air speed.

• High-speed performance

Looks and feels terrific at high speeds; truly a goose-bump-inducing machine! Grooves really well; point rolls and other scale-like aerobatics are easy. Very, very stable at high speeds.

• Low-speed performance

Power-off, slow-speed characteristics can get very mushy, very fast. If your engine starts to sag and/or quits and you aren't up on step, keep those flaps up and the nose down, or you'll probably lose it. If you're lucky, you'll find a flat area on which the model can be bellied-in. But better yet, don't count on luck. To lessen the odds of a low-air-speed engine failure, have your engine checked out on the ground before each flying session. Straight-ahead landings are great. Don't horse it around at anything less than three-quarter throttle! No trim changes are necessary during speed changes. When the aircraft is flying dead-stick and entering a stall, the right wing drops, the nose drops, and the airplane does a slow vertical spiral. It's very easy to recover from in non-emergency, high-altitude situations.

• Aerobatics, etc

It does all WW II fighter maneuvers with ease in a very scale-like manner, i.e., rolls are of the "barrel" variety. Since the high-speed tracking was so good, it came as no surprise that the Mustang grooved though loops with no "corkscrewing" at all. Below 300 feet, stay away from spins! Like a full-scale craft, it takes a few turns to come out of a spin. Inverted flight requires quite a lot of down-elevator. While outside maneuvers aren't its forte, it does them without complaint.

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FALL FESTIVAL

(Continued from page 69)

Ron Thixton brought a very nice Top Flite King Cobra with a camouflage paint scheme. Ron powers it with a Super Tigre 61, and he uses a three-blade glass prop. (I saw my first full-size King Cobra at the 1939 World's Fair in Flushing, NY. It was probably the most advanced aircraft design of the day, and it was the first pursuit ship to have tricycle landing gear. It also had a nose cannon that fired through the spinner. The engine was behind the pilot, and the drive shaft ran between the pilot's legs to the prop. Boy! That was a long time ago. I was just 11 years old.)

Art Schneider put on an exciting performance with his twin-engine model—the 840 Commander. This large 50-pound plane has a 12-foot wingspan, and it's equipped with two G-62 3.8ci engines, 13 servos and two 1200mAh packs. Art uses an 8-channel Futaba PCM radio to fly it.

John Cutrer brought his very attractive Sig Morrisey Bravo, which is equipped with an O.S. 160 twin engine and a 7-channel Futaba radio. The Bravo flies very well.

Bill Hakes flew a sharp-looking, 9-foot-span Piper L4 with an olive-drab finish and white invasion stripes on the wing and the fuselage. He uses a Zenoah G-23 to power this Balsa

(Continued on page 80)

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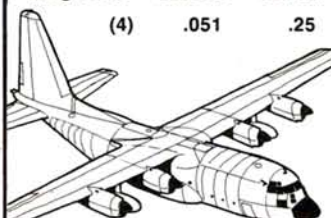
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scale, source information



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economical components

A-26B "INVADER"

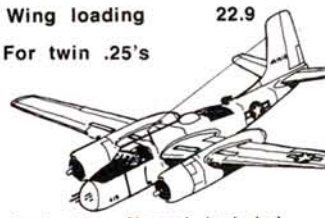
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Wingspan 70."

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Wing loading 22.9

For twin .25's



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THE GENIUS OF A YOUNG INVENTOR

The Buhl pusher-type autogyro was powered by a 175hp Continental engine, circa 1931.

EVERY ROTARY-WING aircraft flying in the world today owes its existence to the pioneering work of one man. He was the brilliant aeronautical engineer and mathematician Juan de la Cierva. His invention of the autogyro was a direct result of his quest to find a truly safe airplane—one that would be independent of the need to maintain forward flying speed to stay aloft.

A rotating-wing configuration was his answer to this problem.

After building several unsuccessful experimental aircraft with rigid rotors, de la Cierva conceived of an articulated rotor with hinged blades. Since this feature allowed each blade to flap up and down, they no longer rotated in the same plane and, consequently, the problems caused by gyroscopic precession were eliminated.



Juan de la Cierva, circa 1930.

The first successful rotary-wing flight took place on January 8, 1923, at the Getafe Airdrome in Madrid, Spain. Unlike

today's helicopters, de la Cierva's autogyro didn't use engine power to drive the lifting rotors. Their rotation was the result of aerodynamic forces acting upon them as the engine in the nose pulled the aircraft forward.

THE Autogyro Story

by FRANK GUDAITIS



Wingless Pitcairn Autogyro

PHOTOS BY FRANK GUDAITIS



Kellett wingless Autogyro.

Several years of flight-testing and design improvements were to pass before this new development came to the attention of an Ameri-

Trophy for outstanding achievement in aviation for 1931.

The unique advertising value of this extraordinary flying ma-

chine and Mexico in a PCA-2 that was sponsored by the spark-plug company. In the decade ending with 1940, Pitcairn's company designed and manufactured 14 distinct models that included enclosed-cabin and "roadable" autogyros. The total output amounted to approximately 100 machines. But for the economic crunch of the deep depression of the 1930s, this number would surely have been much higher. Buhl Aircraft of Detroit built only one (a pusher type), and Kellett Com-



Left: rotor hub to PCA-2 Pitcairn.

formed other liaison duties for the Imperial Japanese Army. The navy employed them as carrier-based and coastal anti-submarine patrols, and they carried two, 132-pound bombs. The Japanese even experimented with fitting small rockets to the rotor-blade tips.

Cierva Autogyro Co. of England continued to develop and refine its autogyros and to license others to manufacture them in various parts of the world. It was during this time that de la Cierva invented a fully controllable rotor mechanism. His invention of the collective and cyclic-pitch control of the rotor blades led to the development of today's helicopters.

While Igor Sikorsky is generally credited with the invention of the helicopter, it was de la Cierva's invention that made Sikorsky's helicopter successful. Basically, Sikorsky's VS-300 helicopter added power to de la Cierva's full rotor-control mechanism together with a power-driven anti-torque rotor in the rear of this aircraft.

Tragically, de la Cierva didn't live to see the bountiful products of his genius. One foggy night in December 1936, he died in a KLM Royal Dutch Airlines DC-2 crash at the Croydon Airport near London. He was 39 years old.

Today, thanks to the dedicated efforts of Pitcairn's son, Stephen, a magnificently and authentically restored Pitcairn PCA-2 can be seen flying over the verdant countryside of New Jersey. It's a beautiful thing to watch, infinitely more graceful and relaxed in its flying than any of today's helicopters.



Left: Steve Pitcairn in PCA-2. Below: 1931 PCA-2 Pitcairn Autogyro.

can aircraft manufacturer. He was Harold Pitcairn, whose sturdy Mailwing biplanes flew early air-mail routes over much of the eastern half of this nation.

Subsequently, Pitcairn traveled to Europe to see de la Cierva's work. He came back with the American rights to manufacture and to license others to make autogyros in this country. Pitcairn sold his other aircraft ventures (one of which eventually became Eastern Airlines) and devoted the rest of his professional life to the development of rotary-wing airplanes.

In addition to manufacturing autogyros, Pitcairn's firm also licensed the Kellett and Buhl aircraft companies to make these whirlybirds. The Pitcairn PCA-2 was the first production-model

chine was quickly recognized by firms such as Beechnut, Champion Spark Plugs, Socony Oil and The Detroit News and others who purchased them for this purpose. The late aviatrix Amelia Earhart set an altitude record of 18,415 feet and crossed the U.S. in one of Pitcairn's autogyros. Captain Lewis Yancey also toured this na-

company became the second largest producer. In 1939, one of its KD-1A autogyros was sold to the Japanese government. Subsequently, the Kayaba Industrial Co. built 240 copies of this machine! During WW II, all of them were used by their military. They flew artillery observation and per-



Present day Umbaugh Autogyro.



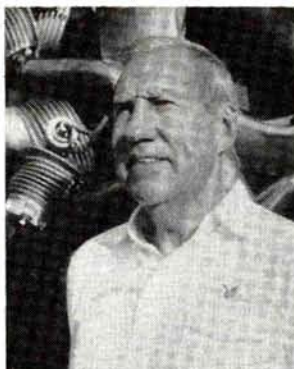
AUTOGYRO



Cierva C8 Autogyro flying over Newcastle, England, circa 1928.



The world's first successful Autogyro flown by Lt. A.G. Spencer on January 9, 1923, at Getafe Airdrome, Madrid, Spain.



Steve Pitcairn with the beautifully restored PCA-2.

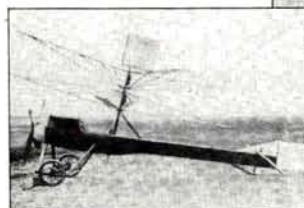
The relative simplicity of this design and its resultant economic advantages would seem to indicate that there should be a place in today's aviation world for this type of flying machine.

For the present, autogyro flying could become a new and exciting class of R/C model building. Several years ago, Karl Eroh of

Bensalem, PA, constructed a beautifully detailed, authentic, 1/4-scale R/C model of the Pitcairn PCA-2 autogyro. With this notable exception, all the R/C rotary-wing fliers seem to have neglected this particular form of whirlybird.

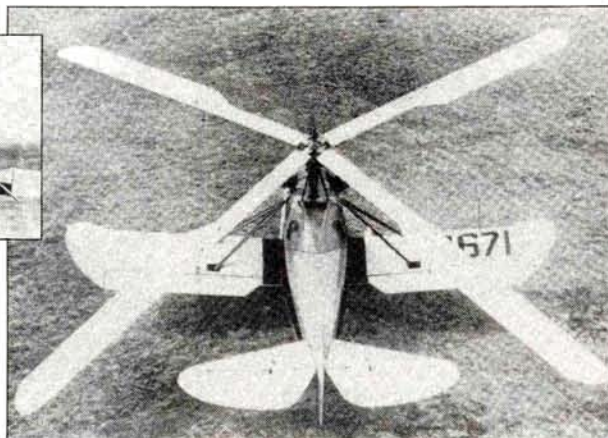
Certainly, the control system would be far simpler than today's R/C heli-

copters. There must be model builders out there who aren't content with flying the same type of rotary-wing aircraft as everyone else. Doing something original and different like building a 1/4-scale R/C model of any one of the autogyros of years past would be an excellent place to start. ■



Above: the first Autogyro—1922.

Right: Kellett K3 convertible cabin Autogyro—210hp Kinner engine.



2 METER

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Sheeted and cap stripwings, flat bottom with wash out. Plug-in wings for easy transportation.

Plug-in and flying stab, canopy, are just a few of the features of the windsurfer.

Wing Span: 78 1/2 in. Length: 42 1/2 in.
Wing Area: 544 sq. in. Airfoil: Flat Bottom Highlift

WINDSURFER 100

Wing Span: 98 1/2 in. Length: 45 in.
Wing Area: 790 sq. in. Airfoil: Modified 205

EZ-1 GLIDERS



Wing Span: 78 1/4 in. Est. Flying Wt.: 26 ounces
Wing Area: 544 sq. in. Airfoil: Modified 205

EZ-2 "100"

A larger version of the EZ-1, easy building with turbulator spars, an open class glider that can perform with the best of them. Plug-in wings for easy transportation. Stress for high starts.

Wing Span: 98 1/2 in. Est. Flying Wt.: 45 ounces
Wing Area: 790 sq. in. Airfoil: Modified 205

TERCEL

GRENAD LAUNCHED



Wing Span: 50 1/2 in. Flying Weight: 11 1/2 ounces
Wing Area: 275 sq. in. Airfoil: Modified 205
Length: 31 1/4 in.



FLIPPER

Wing Span: 50 1/4 in. Est. Flying Wt.: 11 1/2 ounces
Wing Area: 270 sq. in. Airfoil: Modified 205

KASTAWAY



Wing Span: 59 inches
Wing Area: 380 square inches
Est. Flying Weight: 15 ounces
Airfoil: Modified 205



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FALL FESTIVAL

(Continued from page 74)

USA model, which he controls with an Ace Olympic-5 system. The L4 looks very realistic in the air; Bill's craftsmanship is excellent.

Don McGeorge entered a stunning Yellow Aircraft Cap 10B. This model has a super finish on it. Powered by a Supre Tigre 2500 and controlled by an Airtronics radio, it flies extremely well.

Hank Likes, proprietor of Likes Line and manufacturer of giant-scale and scale retracts, brought his very popular Nosen Cessna 310. Powered by two Enya 80 engines and controlled by an 8-channel Futaba system, the model flies very well.

Less Fruh came all the way from Chicago, IL, to get away from the cold winds and to fly his very colorful Acro Dancer. His large 26 1/2-pound plane has a 92 1/2-inch wingspan. Less scratch-built it from Ron Janus plans, and he finished it using Sherwin Williams acrylic-enamel paint and clear-enamel overcoat. He uses a JR X347 radio, seven servos and a 2200mAh battery pack. The Dancer is also equipped with a Sachs 4.2 engine and a smoke generator, and it flies extremely well.

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FALL FESTIVAL

THANKS TO...

A special thanks to Tom Stryker for his help designing our flyers (he also did a great job as our announcer), to Norm Holland, my assistant CD, and to the club members and their wives, all of whom worked so hard to make this the biggest—and best—fly-in we've ever had.

Several companies generously donated prizes, including: Ace, Airtronics, Futaba, Colonial Camera and Hobby, Bob's Hobby Center, Fiorenze Hobby Center, Sun Hobbies, Lanier, Model Airplane News, Coverite, Sig Mfg., Midwest Products, Du-Bro Products, R/C Video Review, Kress Jets Inc., S&R Batteries, Nick Ziroli Plans, Rich Uravich Plans, Hansen Scale Aviation Videos, McDaniel R/C, Ace Maker (American Model Prod.), Likes Line, Aerocell Flightpacks and Tatone Products. Thanks to all!

Well that's it for now—stay well and keep 'em flying. ■

BYRON P-51

(Continued from page 73)

sion, which really looks more like a bomber pilot than a fighter pilot, but he looks so darn good that I used him anyway. This \$25 pilot comes painted and has an articulated head, so

(Continued on page 90)

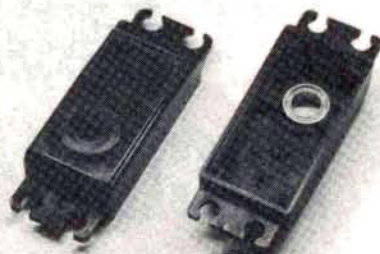
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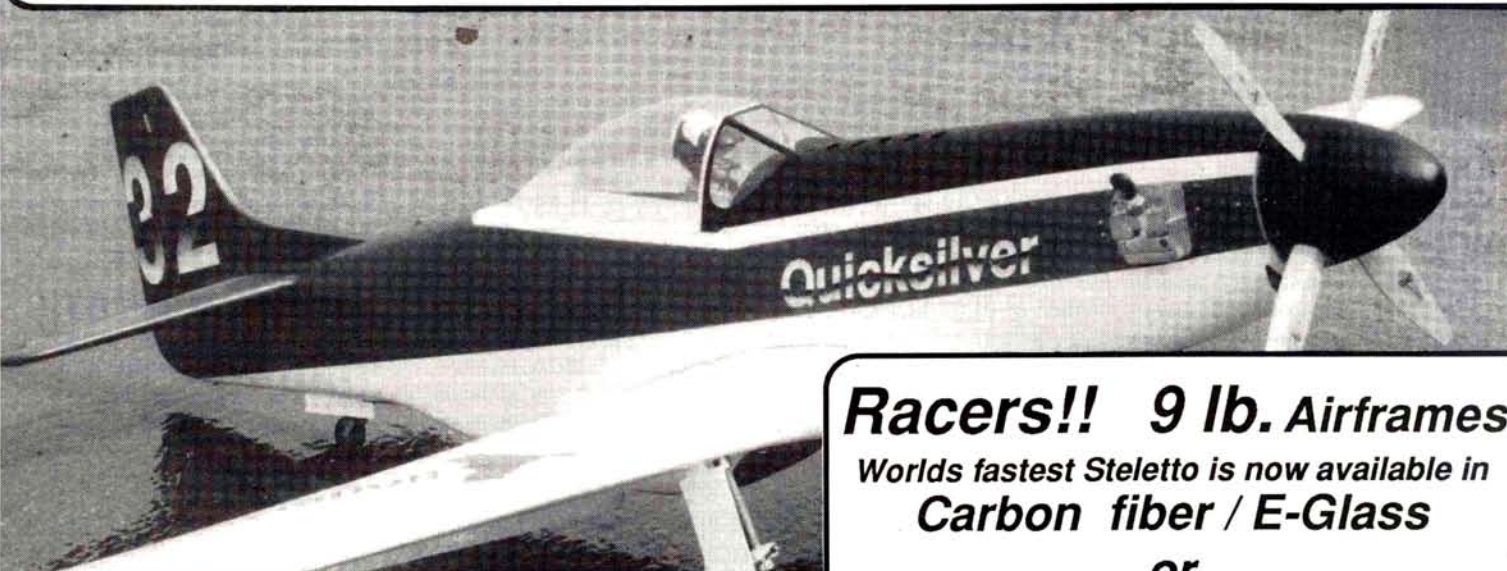


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HOW TO

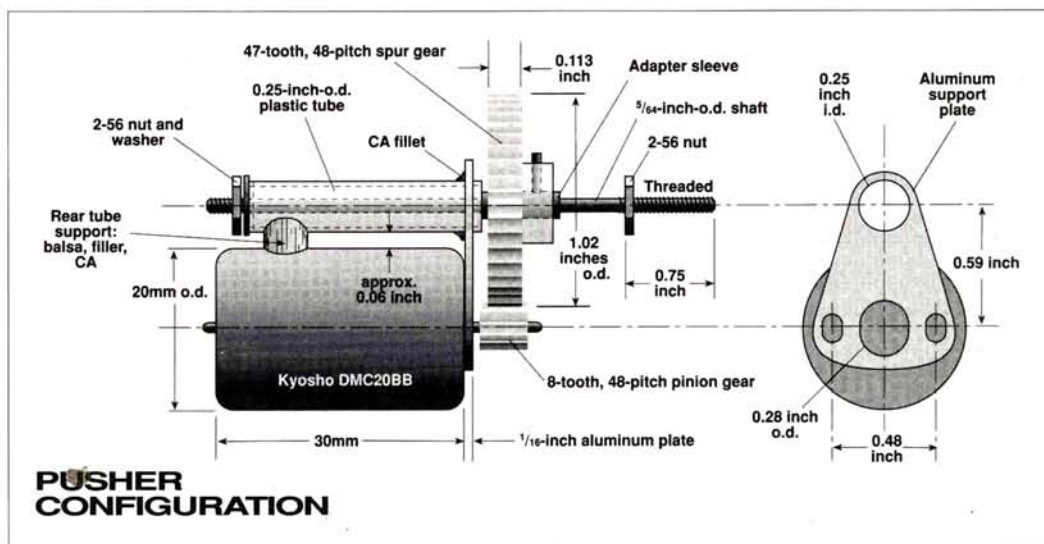
Build a Miniature Electric-Drive System

by TOM DAVIS

6- and
11-minute,
full-power
flights



This is me tossing the Comet P-38. It has easily made flights of 10 to 16 minutes using the drive system described in this article.



THE IDEAL MOTOR and gear reduction for electrics that weigh 10 ounces or less should weigh less than 1.5 ounces and have a reduction ratio large enough to keep static prop rpm below 5,000. The system described in this article can put out 20 to 30 watts and spin a rubber-

band-powered prop of at least 5.5 inches diameter. The motor must be designed for six or seven cells to allow the use of weight-reducing BEC throttles. Also, for a given target output power, large cell counts, i.e., more than six, keep the motor current below 5 amps. This lower current mini-

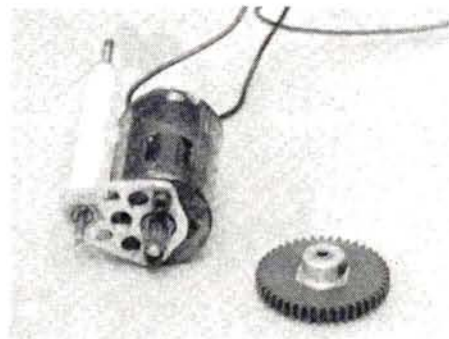
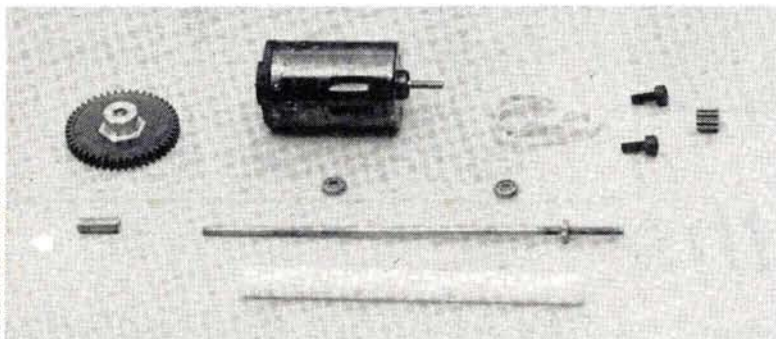
mizes resistive power losses and battery heating. The Kyosho* Le Mans DMC20BB motor fills the bill perfectly. It's designed for six cells, has ball bearings, weighs only 31 grams (1.09 ounces) and can handle over 20 watts.

The gears and bearings are standard 1/24-scale slot-car parts that

should be readily available at local slot-car raceways or hobby shops that handle slot cars.

GEARBOX CONSTRUCTION

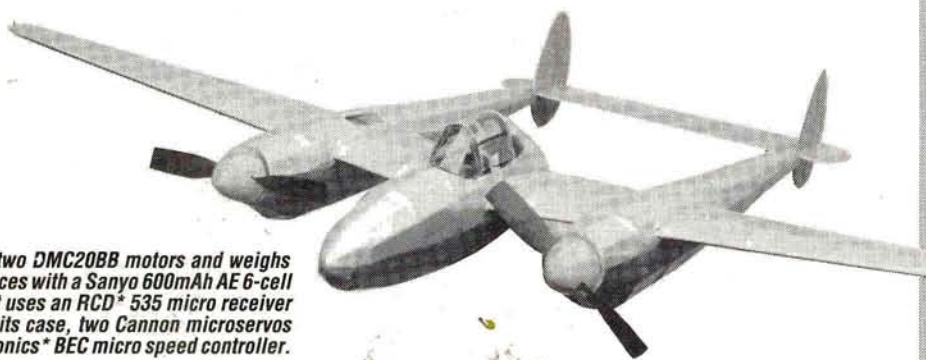
This gear reduction can be assembled either as a pusher or a puller. The reason for the two configurations is that the



Far left: the components of the gear-drive system before assembly.

Left: the system is partially assembled.

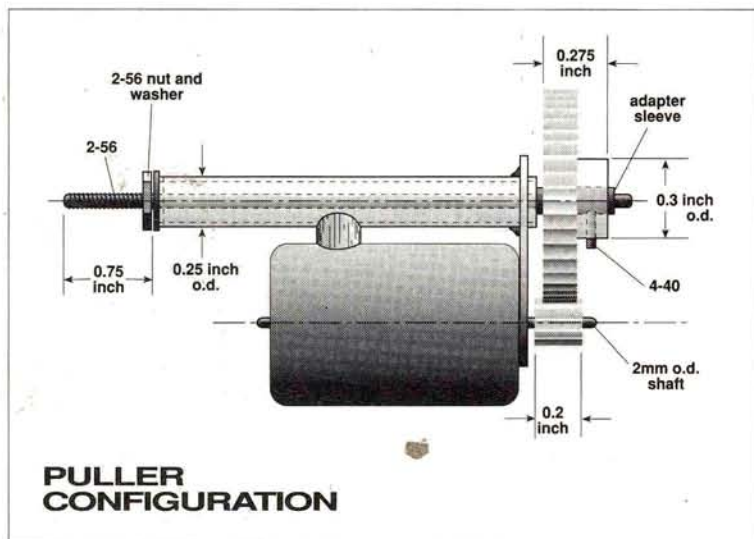
PHOTOS BY SCOTT A. RANKIN



My P-38 uses two DMC20BB motors and weighs about 12.5 ounces with a Sanyo 600mAh AE 6-cell battery pack. It uses an RCD* 535 micro receiver removed from its case, two Cannon microserves and a ModelTronics* BEC micro speed controller.

Gear Drive Specifications

Weight with prop = 1.4 ounces
Reduction ratio = 5.875:1
Gear-hub bore o.d. = $\frac{1}{8}$ inch



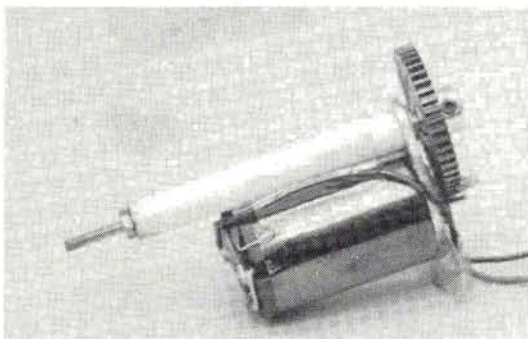
ILLUSTRATIONS BY JONATHAN T. KLEIN

DMC20BB runs poorly in reverse, regardless of motor timing.

Cut about 4 inches of music wire to make the prop shaft. (A bench grinder works nicely for this job.) Grind the shaft ends flat, finishing with a slight bevel cut to clean up the ends. Clamp the shaft in a vise with 0.75 inch exposed.

Heat the exposed shaft end with a propane torch until it becomes dull red, and then allow it to cool slowly. Now the shaft end can be threaded easily with a 2-56 die. After threading the first 0.75 inch of the shaft, the 2-56 nut can be spun on and jammed where the threads end.

The completed gear-drive tractor system using the Kyosho DMC20BB motor.



In the pusher configuration, the other end of the shaft will also be threaded to accept a 2-56 nut. This second nut will serve as a shaft retainer. Using the same procedure as before, thread about 0.25 inch of the shaft. To enable the bearings to slide onto the shaft, the threads must be evenly sanded. Remove just enough material to allow the bearings to slide on.

Cut out and drill the aluminum support plate that retains the 0.25-inch-o.d. plastic tube, using the given dimensions. The 0.25-inch hole for the tube must be slightly enlarged to allow the front bearing to be inserted without excessive force. Use a hobby knife to ream the hole. You may have to slot the other holes to allow for gear-lash adjustment. Use a file to finish the plate's edges.

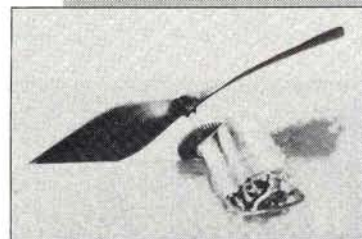
Inspect the gear adapter sleeve (Du-Bro* no. 212 coupler) to ensure that its bore is centered; if it isn't, select one that is. Using a no. 47 or a $\frac{5}{64}$ -inch drill bit, enlarge the adapter's i.d. to accept the prop shaft. Cut off about 0.35 inch of the sleeve with a hacksaw. Use the uncut end to ride against the inner race of the front bearing.

Press the pinion gear onto the motor output shaft. If it's too loose, you may have to tin its bore lightly with solder. Be careful not to apply force to the motor case. Install the support plate on the motor. Cut the plastic tube to length (see diagram), making sure the ends are cut square. Push the tube through the support plate so that it's flush with the other side of the plate. Insert the bearings, and slide the

IN SEARCH OF A MOTOR

The Klingberg Flying Wing shown in the photos is powered by an AYK Magnum AP racing motor. To my knowledge, this motor isn't available in the U.S., but maybe someone reading this article will know a source. I've heard that in Japan, there's a proliferation of these high-quality 24mm motors. The AYK is a high-performance, precision racing motor in a small, light package. It features a ball-bearing drive, an aluminum front bell, adjustable timing and replaceable brushes. This 50W motor weighs only 1.9 ounces. It's 24mm in diameter, has a 2mm shaft diameter and produces a no-load rpm of about 50,000 on 7.2 volts.

The all-up weight of the half-size Klingberg with the AYK and a Sanyo 600mAh AE 6-cell battery pack is 10.3 ounces. In flight, the motor produces about 40,000rpm and generates much higher rpm in a power dive. Spinning a Peck Polymers 7-inch prop, static prop rpm are about 6,900 (or 36,000 at the motor, given the 5.22 gear reduction). Flight times range from 6 to 15 minutes. The half-size Klingberg performs well with the DMC20BB motor, but its perfor-



AYK Magnum AP racing motor.

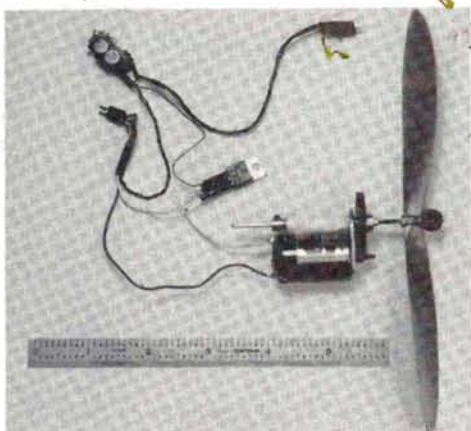
mance improves with the AYK Magnum AP.

[Editor's note: if anyone supplies AYK—or comparable, miniature, high-performance racing motors—in the U.S., please drop us a line.]

Miniature Electric Drive System

shaft and gear into place. Adjust the plate so that just a slight amount of gear lash is detected with the tube parallel to the motor case. Shim the tube with a piece of balsa, as shown. With the tube parallel to the motor, tack the balsa shim and plastic tube to the motor housing with CA. Remove the prop shaft and bearings. Finish gluing the tube into place, as shown. Use a light coat of epoxy to hold the bearings in place. The propeller bore must be drilled out to fit the output shaft. Assemble, and you're ready to go.

270mAh 6-cell pack at 2.9 ounces. Full-power flight times of between 5 and 6 minutes are common. Sanyo 600mAh AE cells are also an excellent choice; they provide nearly twice the flight times



SPECS AND PERFORMANCE

With a 7-inch Peck Polymers* rubber-powered prop on six cells, 4,000rpm static at 3.5 amps is common. This is equal to a motor rpm of about 23,500. The complete motor with gear reduction and prop weighs a very light 1.4 ounces. With this system, small R/C electrics can fly at an acceptable level of performance for more than 5 minutes at full power. I usually get at least 80, 6-minute flights before the motor brushes wear out.

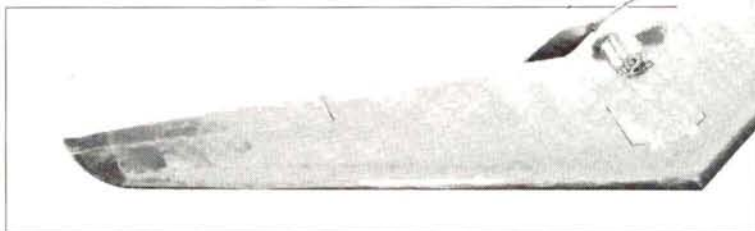
BATTERY CONFIGURATIONS

The standard battery pack to use with this system is a Sanyo*

of the 270 cells. These cells, if operated at less than 6 amps, perform amazingly well and weigh only 4.2 ounces in a 6-cell configuration. The internal resistances of the 270mAh AA and the 600mAh AE cells are 0.015 and 0.010 ohm respectively. The lower resistance of the 600 cells allows the motor to run at a slightly higher power level. These cells are available from Cermark*.

- Kyosho Le Mans DMC20BB motor
- 2, 2mm-i.d. x 5mm-o.d. x 1.5mm-thick, no-shield, flanged ball bearings (An ABEC 3 precision bearing is adequate.)
- 2, 1/8-inch x 4-40 socket-head setscrews
- 5/64-inch music wire
- 0.25-inch o.d. x 0.20-i.d. polystyrene tube
- Cox* spur gear: 47-tooth, 48-pitch, 1/8-inch-i.d.
- Pinion gear: 8-tooth, 48-pitch, 0.078-inch-i.d.
- 1/16-inch-thick aluminum plate
- Du-Bro no. 212 coupler: .072-inc-i.d., 1/8-inch-o.d.
- 2, 2-56 nuts (The second nut is used in the pusher configuration only.)
- 5/64-inch or 2mm-i.d. washer.
- CA, light filler, epoxy, scrap balsa, propane torch, vise, 2-56 die, small round file, flat file, 1/4-inch and 5/64-inch drill bits, hacksaw

◀ Set-up for the 1/2-scale Klingberg Flying Wing, the Kyosho DMC20BB motor is shown with a pusher gear-drive system and a 7-inch Peck Polymers prop. Connected to a ModelTronics BEC speed controller, the entire system weighs 1.8 ounces.



◀ The Klingberg is shown here with the AYK Magnum AP racing motor, which offers better performance than the DMC20BB. It also uses an RCD 535 micro receiver removed from its case, two Cannon microsensors and a ModelTronics BEC micro speed controller.

For a superlight setup, use an Eveready 80mAh, rechargeable, 7.2V transistor-radio battery. Be sure to buy only the packs that have two white dots on the case bottom. The other packs have "pile construction," and their high internal resistance renders them useless.

P.O. Box 4021, Champaign, IL 61824.
Du-Bro Products, 480 Bonner Rd., Wauconda, IL 60084.
Peck Polymers, P.O. Box 710399, Santee, CA 92072.
Sanyo Electric, Battery Division, 200 Riser Rd., Little Ferry, NJ 07643.
Cermark, 107 Edward Ave., Fullerton, CA 92633.
Cox Hobbies, 350 W. Rincon St., Corona, CA 91720.
RCD, 9419 Abraham Way, Santee, CA 92071.
ModelTronics, 6500 6th Ave. NW, Seattle, WA 98117.

*Here are the addresses of the companies mentioned in this article:
 Kyosho/Great Planes Model Distributors.

SELECTING A PROP

Why use rubber-band-powered props and gear reduction for small electrics? Small electrics in general are plagued with several problems, the worst being high weight for their size, low power and pitifully short duration. To help overcome these problems, the model's available power must be utilized to its fullest.

As a rule of thumb, large, slow-turning props are more efficient than small, high-

revving props. This is more pronounced as prop size is reduced and as rpm increase. This can be partially attributed to a propeller's decreasing Reynolds numbers as its size is reduced, and to rapidly increasing parasitic blade drag as rpm increase. To help minimize this effect, small electrics should use rubber-band props with large gear reductions.

As an example, consider my 1/2-scale Klingberg Flying Wing. It has a 39-inch-span

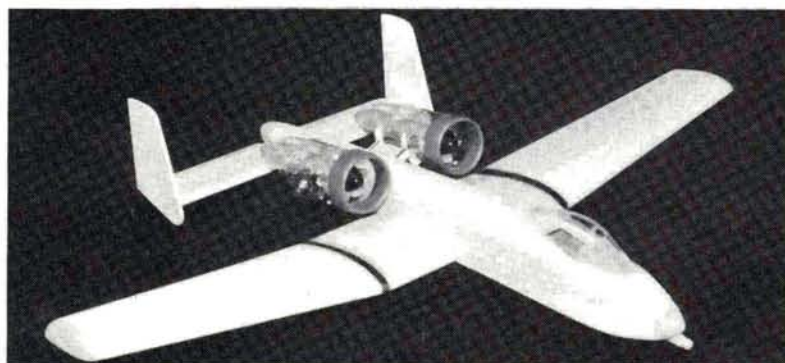
and an all-up flying weight of 8 ounces. Its motor is a Kyosho DMC20BB with a 5.9:1 gear reduction, and it has a 7-inch Peck Polymers prop that spins at 4,000rpm (static). I use either a Sanyo 270mAh 6-cell pack at 2.9 ounces or a Sanyo 600mAh AE 6-cell pack at 4.2 ounces. The former allows full-power flights of more than 6 minutes; the latter, full-power flights of more than 11 minutes.

SPORTY SCALE TECHNIQUES



FRANK TIANO

JUICE FOR JET JOCKEYS



Cute little A-10 by Kress Jets features balsa-and-carbon-fiber construction; it uses two Cox TD .09s or a pair of .15s! Just 55 ounces on 311 square inches.

BOY, ISN'T IT just fabulous that good flying weather has finally arrived? I know it's that time of year when you're constantly faced with the decision to stay in the shop and build, or get out to the field and fly. I, for one, find the dilemma a welcome one!

I'd like to take a moment to thank all of you who have written to compliment us on the "Sporty Scale" column. I say "us," because I simply write the thing; a very talented group of people take my manuscript and photos and turn them into the finely tuned product you have before you. Also, to satisfy all who have asked for more jets in the column, I'm devoting this

month's airspace—with the exception of one announcement—entirely to ducted-fan information. So, without any further procrastination, let's get going.

As you're probably aware, there are only a few successful ducted-fan manufacturers in the United States today. Now, I'm not talking about basement operations that produce one or two kits per month; I'm speaking of companies that have full-blown manufacturing facilities, you know—machines, molds and manpower!

ETA HAS ARRIVED

Well, a brand-new company has appeared on the horizon, and first indications have led us to believe that it will be quite successful in the field. ETA* is headed by the well-known Dr. Timothy Farrell and his not-so-well-known (yet) partner, Eldon Bennett. ETA will produce sport-scale, ducted-fan kits that feature simple construction, near-scale outlines and, in some cases, a single-engine installation in twin-engine subject matter.

For example, their first offering is a 64-inch-long F-18 that weighs in at 9 to 11 pounds (with retracts) and has a wingspan of 54 inches. Their second kit is a 70-inch-long A-7 Corsair, and the third release will be a Northrup F-89 Scorpion. The F-18 uses a Dynamax* fan for power, and the A-7 will use a ducted Byro* blaster to get things going.

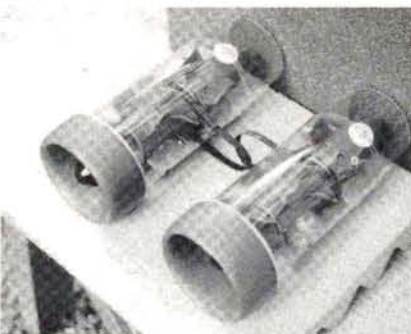
I called Tim and Eldon and asked them

exactly what their intentions were for the long run, and this is what I was told: "Our intent is to provide stand-off scale designs at a reasonable price. We offer builders' kits, not ARFs. We don't want our customers to buy a disappointment, so keep in mind that our stuff does require modeling skills and isn't intended for the beginner. We promise that all designs are thoroughly flight-tested before we release them."

The kits come with a resin-fiberglass fuselage, internal ducting, a canopy, foam wing and stab cores and instructions. They all can be powered with anything from a Byro Jet to a Viojett. Why not write to them, or give them a call?

JUNIOR JETS

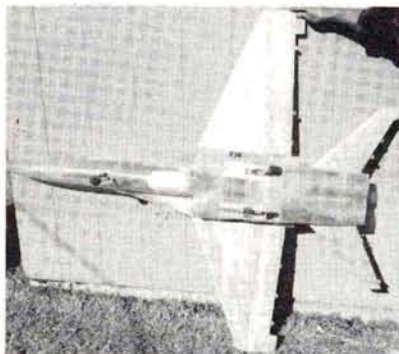
Another small, but quite successful, company is headed by Bob Kress, a retired



The first look at a Kress's two-stage small fan and belt-drive system to be used in the A-10, or on any subject that has two engines mounted off the fuselage, like a Lear or Sabre Liner.

Grumman engineer. Bob's company is called, appropriately, Kress Jets*. Kress Jets doesn't play with the big boys! Instead, this company specializes in smaller ducted-fan models that really fly well and look great to boot. Bob offers several neat subjects, including a Viggen Trainer; but the kit that rang my chimes was a little cutie of an A-10 powered by two Cox TD-09s.

The A-10 is an all-balsa kit with a few vacu-formed parts and a polyurethane wing; and if that doesn't turn you around backwards, how about this: Bob has a new, two-stage belt-drive unit that turns two of



ETA's single-engine F-13 uses simple Spring Air landing gear and a single ducted fan. ETA sells only what they've flown—a refreshing new concept from a small kit company! The bottom view clearly shows a typical balsa-and-foam construction. Notice the absence of complicated landing-gear doors and linkages. It's a real, true sport-scale model.

the smaller ducted-fan units with one larger engine. The larger engine sits in the fuselage, and a long, lightweight crankshaft extends toward the rear. At that point, two belts (one to the left and one to the right) extend out to each powerplant. Yes, it's experimental, and yes, he needs input from a few pioneers, but initial tests indicate that it works well in a light model. No, it isn't intended for two fire-breathing Violett .91s and a bicycle chain! By the way, Bob's stuff does fly well.

Another Bob that you've all heard of is Bob Fiorenze. Bob owns and operates a hobby shop in the Orlando area of Florida, and he has won several major modeling events in his career. Fiorenze Hobby* is one of several stores in the country that handles and promotes the entire line of Yellow Aircraft kits—a line that includes a selection of prop-powered designs as well as a few jets.

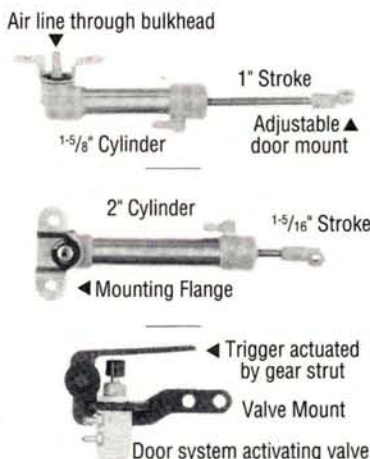
Most noteworthy of Bob's achievements have been a first at the AMA Nationals, a first at the U.S. Scale Masters and a first at the very first Top Gun Invitational. He's always a joy to watch fly, and he's even more fun to watch in the pits, as he's probably the most paranoid, worrisome individual I know! If you think I'm over-reacting, I'm not. For example, Bob knows exactly where the



This is it! A real Turbojet! It weighs 3.5 pounds, provides 11 pounds of thrust at 104,000rpm; 4.3 inches diameter, 11.8 inches long. It produces a 72dB noise level! It uses propane gas as fuel. Price under \$4,000. Currently manufactured in Europe.

Scale Option Cylinders

by Bob Violett Models, Inc.



Bob Violett's air cylinders are not only a work of art, but they also provide a way for any scale modeler to address a gear-door problem. With a little imagination, you can duplicate almost any subject in miniature.

jet stream is at all times!

Because he worries about so many things, it was only natural for him to come up with a new fuel that helps him relax while he's flying one of those big twin-engine jets that have made him so famous. That's right, fuel.

You see, Fio has decided that all ducted-fan motors need a little extra lubrication while they spin away in excess of 23,000rpm. So, he had Morgan Fuels* make him a very special Jet Smoker Fuel that produces a nice, thick contrail, and this allows worrywart Bob to see whether both fans are turning. In other words, no surprise flameouts for Mr. Fiorenze! This fuel is oil-rich, and it works very well in prop engines, too. In fact, I use it quite frequently in any engine that will tolerate 22-percent oil, which is what this fuel contains. Prices are \$12.95 for the 7-percent-nitro blend and \$14.95 for the 12-percent blend.

Still another Bob that I'm sure all you guys have heard of is Bob Violett. He has just released a couple of neat gadgets that will work on jets or prop aircraft in a variety of applications. We're talking about miniature air cylinders here, and boy, they're just what the doctor ordered for some of our tight landing-gear door installations. Catch a glimpse of the picture, and

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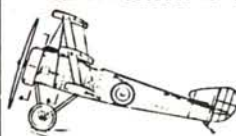
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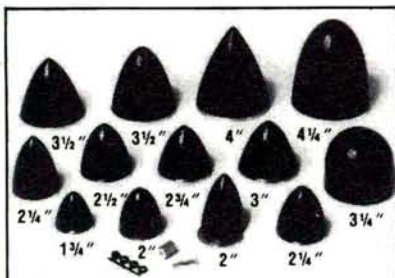


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SPORTY SCALE

you'll see what I'm talking about.

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Still another breakthrough from Bob Violett Models* is the brand-new Maverick, a scale jet trainer that looks like almost anything you'd like it to look like and flies like a jet trainer is supposed to. This means that it has good looks and stable flight characteristics. The Mav features a degree of prefabrication that you could only dream about until now. I'll have pictures next month, but I'm telling you that this bird is gonna be hot. It's just big enough for us old guys not to lose in a bright sky, just slow enough to keep our brains in the happy mode and just quick enough to create some excitement when we get that little dash of boldness we used to thrive on about 20 years ago or so!

NOISE MANAGEMENT

One of the techniques described in the Maverick's instruction manual and in several issues of Violett's newsletter, "The Inlet," is a manner in which you can be instrumental in keeping your flying field from being lost owing to unbearable noise levels. Now, I'm assuming that your field is in an area that deserves this consideration. I'm not talking about those of you who are fortunate enough to fly miles and miles away from civilization and need not worry about noise at all.

B.V. suggests a program that incorporates throttle management. In other words, use full power only when you absolutely must. Once your plane is airborne, it may not be (and probably isn't) necessary to make your turnarounds at full blast, especially if you're flying over someone's house. The advantages of practicing this procedure are many. Lower dBs are one, prolonged engine life is another, and safety can well be considered still another; so give it a try. Just throttle back when you're able, and you'll be surprised at the difference a couple of thousand rpm make!

Please keep in mind that noise levels, when measured in dBs, really shouldn't be measured on the ground 20 or 30 feet away. To get a realistic idea of what the sound level is to anyone in the vicinity, why not measure the dBs at several hundred feet? I mean, isn't that the distance the airplane will be from most human ears anyway? That is, unless some of you "hotrods" are doing low passes at something like 20 feet over some guy's roof or 15 feet outside his bedroom window! It's great to be noise-conscious, but please be realistic.

PROP CHATTER

Before I forget, I've done a follow-up on something I wrote about a couple of issues ago. You may remember that I mentioned that one of Dynathrust's*s* props was occasionally throwing a blade. This defect was solved, and we told you about it right here. Dynathrust even offered to inspect your props and replace any defective units at no charge.

Although very few of you contacted Dynathrust, Ray Colelli has informed me of an alarming practice. Several props that were returned had deep gouges about the prop hub where a spinner had rubbed. Guys, you absolutely must have total clearance around the prop and spinner. In other words, when you cut the spinner to fit around the prop, make

sure that there's at least 1/16- to 3/32-inch clearance, or you're asking for trouble by promoting the chance of a thrown blade. It's really not fair to condemn a prop manufacturer for a problem that we may be creating ourselves. Dynathrust produces one of the best-made props available, featuring very true pitch and an amazing resistance to breakage.

Last, but not least, I have something for which we've all been waiting a long time. Remember a few months ago, when I told you about the cross-reference color-chip guide that allows you to find color chips offered by the federal government that are close matches to those used in World War II? Well, a fellow named Mike Marecki

M.M.

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has come to my rescue and, therefore, to your rescue as well. Mike's company, M&M Models, has manufactured a book containing the most popular color chips of WW II, and they're all categorized by country on removable sheets. These large, painted, color chips have been declared accurate by the AMA's scale board chairman, David R. Platt!

The book includes paint chips for the following: U.S. Army Air Force (including olive drab), U.S. Navy/Marines, and Germany, Italy, England and Japan (army and navy). I will be the exclusive distributor of this fabulous, limited-production book, which, incidentally, is very much like the Chicago Scalemasters Guide from many years ago. I'll be advertising them right here in *Model Airplane News* in the next few issues, but if you have a contest coming up and you need one, the price is \$29.95, plus \$3 for shipping (UPS to any street address in the USA—no P.O. boxes). I hate honking my own horn, and maybe I'm really not, because Mike did all the work, but I'm so high about this book that I'll guarantee satisfaction or your money back.

So, whattayathink?—enough jet stuff to keep you going for a while? By the way, don't forget that the editor of *Model Airplane News* really does read your letters and really does converse with the publisher to decide what should be added to or deleted from the magazine. So, why not write to Major Tom and tell him what your views are. In the meantime, remember that incidence isn't the number of times you've fastened the wing to the fuselage and decollage isn't something you normally find in a gentlemen's magazine. Your six is clear.

*Here are the addresses of the companies mentioned in this article:

ETA, 5202 43rd St., Lubbock, TX 79414; (806) 791-0128.

Dynamax; distributed by Jet Model Products, 211 N. Mullen Rd., Belton, MO 64012.

Byro; distributed by Byron Originals, P.O. Box 279, Ida Grove, IA 51445.

Kress Jets, 4308 Ulster Landing Rd., Saugerties, NY 12477; (914) 336-8149.

Fiorenze Hobby, 420 W. S.R. 434, Winter Springs, FL 32708; (407) 327-6353.

Morgan Fuels, P.O. Box 1201, Enterprise, AL 36331.

Bob Violett Models, 1373 Citrus Rd., Winter Springs, FL 32708; (407) 365-5869.

Dynathrust, P.O. Box 91, Georgetown, TX 77336; (615) 476-2330.

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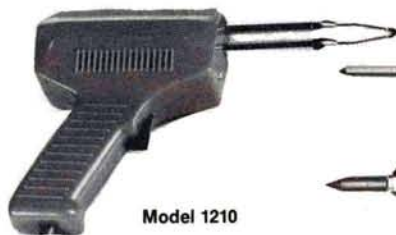
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BYRON P-51

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It showed no bad habits other than wanting to nose-over on the wet grass field, but the tail weight took care of that problem. The landing gear has stood up very, very well, and the bolt-on wing panels have proven to be effective and safe. This airplane is so steady and solid that you can easily fly it about 2 feet off the deck right down the center line. It sure makes for a pretty picture when you do those flybys!

The big flaps are very effective, and power must be carried when they're deployed. The Mustang is forgiving, but it won't let you come in low and dirty without any air speed; so just keep the throttle cracked a little above idle, and let the airplane make its own descent. Use the elevator to flair gently when the mains are about to touch, and you're home.

As with any airplane of this size, I strongly suggest a preflight check before each day's flying or after any sort of nose-over or mishap. Parts can loosen, and it's most important *not* to fly if everything isn't absolutely perfect. In other words, if you don't let this Mustang down, it won't let you down either! If I were an airplane critic, I'd award the new Byron P-51D Mustang 3 3/4 stars for how easy it is to build and a full four stars for the way it flies. It doesn't get much better than that!

(Continued on page 93)



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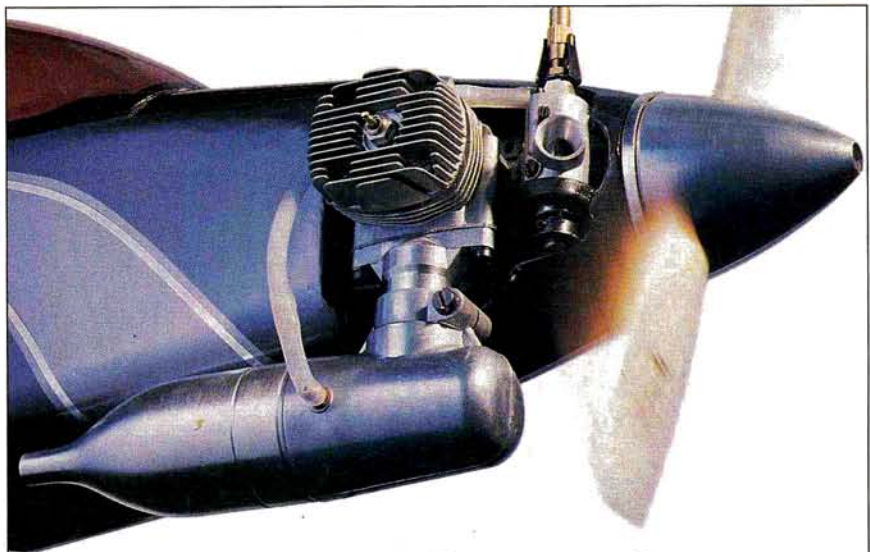
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BYRON P-51

(Continued from page 91)

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Dynathrust Props, 2541 Northeast 11th Ct., Pompano Beach, FL 33062.

Pica Enterprises, 2657 NE 188 St., Miami, FL 33180.

Major Decals, 21 Fisher Ave., E. Longmeadow, MA 01028.

AIRWAVES

(Continued from page 10)

view. Next, get a description of the color scheme that was used on the full-size aircraft. This can be an artist's rendition from a book or the box top of a plastic scale kit. You could also use a black-and-white photo of the aircraft if it has a caption that describes the markings and colors. You should insert color chips into the booklet for proof of color. The last ingredient is something you do while you build the model; it's called "craftmanship." The judge simply rates how accurate to scale, attractive, etc., your finished work is."

We add that it's good to present this documentation in a three-ring notebook with clear plastic sleeves that hold your material together. The judges at scale contests are very busy, so the neater your presentation is, the easier it is for them to review your model, and the better it is for you! (Continued on page 95)



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AIRWAVES

(Continued from page 93)

Most successful modelers get their documentation together first and then build their models according to that material. If you build a kit that's supposed to be to scale but it doesn't match your documentation, you'll be downgraded accordingly. I've been building a Balsa USA 1/3-scale Cub, and I originally wanted to build it into a Navy NE-2. When no good documentation was available, I simply changed to the easier-to-document L-4. If I had built and painted what I thought an NE-2 should have looked like (according to old black-and-white photos), I wouldn't have been able to prove it to the judges. Remember, scale documentation is where you find it; it's half the fun of scale modeling!

GY

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(Continued on page 96)

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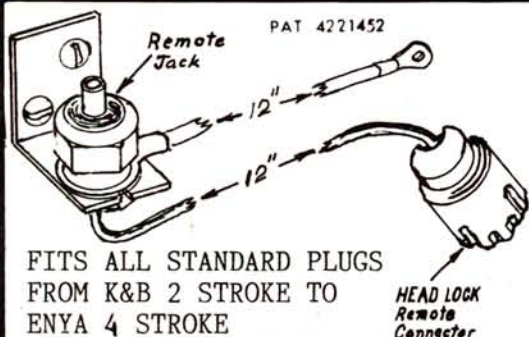
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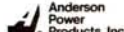
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AIRWAVES

(Continued from page 95)

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ALAIN MERIER
Sherbrooke, Quebec, Canada

Alain, here are some names and addresses. These aren't all of the sources, but they're a good cross section. For Top Gun videos, contact Werner Kopp, Prop Wash Video, 2973 Berman Ave., Las Vegas, NV 89109 (\$29.95), or Ken Wells, R/C Video Magazine, 27318 Bailey's Neck Rd., Easton, MD 21601 (\$29.95). For a video of the Byron Aviation Expo '91, write to Aviation Expo, Byron Originals Inc., P.O. Box 279, Ida Grove, IA 51445 (\$25 including shipping). To see the action at the Madera R/C Unlimited Races, contact Pilot Communications, 9865 Galena Ct., Rancho Cucamonga, CA 91730 (\$24.95, plus \$3 shipping). TA

BOB'S T-CRAFT

While glancing through a collection of old magazines, I stumbled upon a few pictures of a clipped-wing Taylorcraft by Bob Melitz (Model Airplane News, April '85). A mention was made of plans being available soon. Could you tell me if there are still plans available for this particular model and, if so, where

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AIRWAVES

to find them? I already have drawings for an '82 clipped-wing but it isn't very accurate, and it's very vague in some areas.

STEFAN VAN NIEUWENHOVE
Adinkerke, Belgium

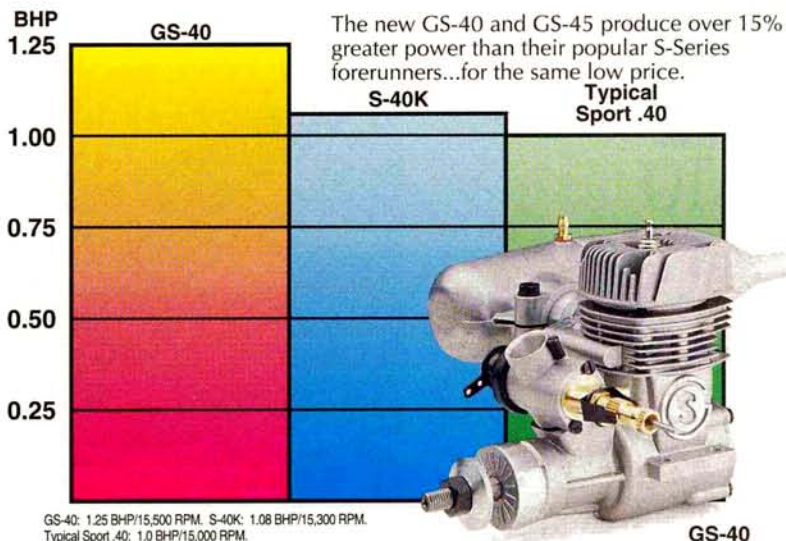
Stefaan, we gave Bob a call and are happy to report that yes, he still sells these plans. (He was happy to know that our readers are still interested in his work!) Bob can be reached c/o Cedar Bridge Scale, RR 4, Creemore, Ontario, Canada L0M 1G0. The price for the 1/3-scale Talyorcraft is \$30, plus \$3 for shipping and handling. Make your check out to Bob. His work is well worth the price! GY

BABY BOOMER MODELERS

I can't believe that, in your response to a letter in the April '92 issue, you stated that you're "not familiar with" the Hobby Helpers plans service. I'm building a 1/2A U-control Knight Twister (10-inch span!) from a set of Hobby Helpers plans right now. I also have eight other sets of their plans in my archives, and a total of 22 models (including an F-86 for a Dyna-Jet!). I can only conclude that you folks are much younger than I, since anyone who was into modeling in the '60s is very familiar with Hobby Helpers plans. Incidentally, there's little or nothing in 1/2A CL supplies available in the hobby shops that we're encouraged to patronize. That used to be a great low-cost, entry-level model arena for youngsters, but it seems to be long gone. There are plenty of 24-inch props available, but not one 4-inch, not to mention small wheels, spinners, etc. Wouldn't it be great to go flying with all your gear and your model in a shoebox?

EDWARD T. STANFILL
Alexandria, VA

Well, Ed, you have us there. Our editors' average age is 37. Most of us were about 9 years old back then, and I, for one, was heavily into stunt U-control. My Dad built scale, but it was of the free-flight, rubber-
(Continued on page 102)



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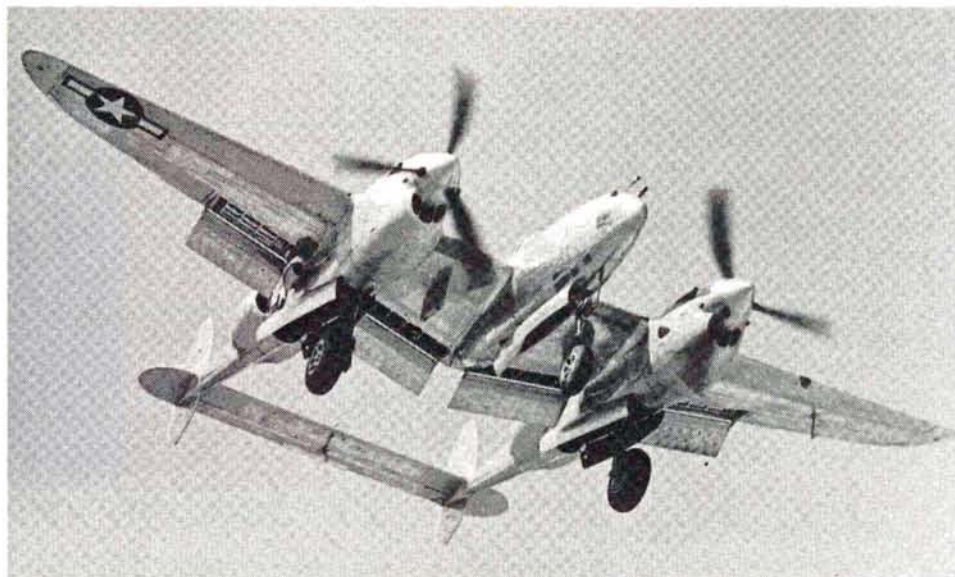
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HOW TO



PHOTOS BY ROBERT M. ALMES

The P-38 looks majestic as it comes in for a landing with its Fowler flaps deployed.

Build Fowler Flaps

by ROBERT M. ALMES

A simple, functional design for giant-scale R/C aircraft

HARLAN FOWLER JOINED the Lockheed Aircraft engineering staff in late 1935. There, Fowler introduced the flap design that has become widely known as the "Fowler flap." Lockheed was so impressed with Fowler's flap idea that they underwrote a patent on it. The test bed for the flap system was the Model 14 Super Electra in January 1937. The Lockheed Hudson, P-38 Lightning, Constellation and Consolidated's B-24 Liberator employed Fowler flaps. Numerous aircraft, including modern-day jets, use Fowler flaps.

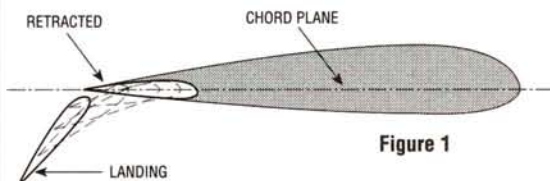
A practical application of Fowler flaps has long been the quest of avid scale enthusiasts, particularly of P-38 fans. Note the photo showing a Lockheed P-38, with its sizable flaps fully deployed, coming in for a landing.

Fowler flaps were a distinctive feature of this famous aircraft. Imagine the sight of those large flaps hanging from the trailing edge of your scale P-38 as it comes in for a landing.

In the full-scale P-38 Lightning, four flaps are linked together by pulleys, cables, pushrods and screw jacks. The mechanics and linkages involved don't lend themselves to plug-in wings and other disassembly requirements for transporting R/C aircraft to and from the flying site. After careful consideration of the design requirements, I developed four flap units for a giant-scale P-38. These are linked together by a single air line. These flap units are integrated pneumatic/mechanical devices; the design provides support

and carriage for each flap. A Robart* air-line quick-disconnect is used at each wing plug-in point.

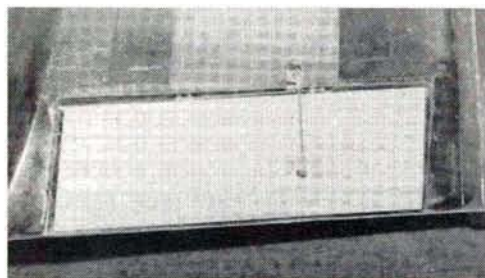
I flight-tested the design with a modified Ace R/C* "Big Bingo." Two 14x4-inch flaps were installed, as well as conventional ailerons. Three pilots have flown the aircraft and uncounted airborne extensions and retractions have been made. One of the distinctive features of Fowler flaps is that the horizontal and downward angles are



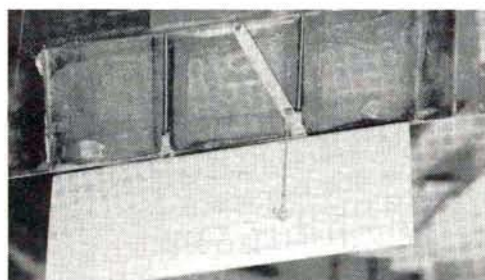
Action of Fowler flaps (flaps have constant chord and airfoil).

always in perfect balance. Therefore, very little force is required to operate the flaps. At full extension, each cylinder spring exerts a 1-pound retraction force, and the flaps retract easily, regardless of aircraft speed.

The photographs show flaps in a 1/6-scale P-38. A different scale or a different aircraft will require slight modifications, e.g., a 1/5-scale P-38 has a flap chord of 4 inches. The air cylinders used have a stroke of 4 inches, and the mechanical linkage provides a progressive downward angle of 40 degrees. On the other hand, a 1/6-scale P-38 has a flap chord of 3 inches. In this case, the air cylinders have a stroke of 3 inches, but the mechanical linkage must still allow a progressive downward angle of 40 degrees. The smaller scale allows for a shorter crossbar, thus, the cylinders can be closer together. The shorter stroke and crossbar result in a smaller unit. A careful examination of the Figure 2, which is for a 1/5-scale P-38, will reveal the nature of the operation. Appropriate adjustments can be made for other applications.



Detail of Fowler flaps installed on Yellow Aircraft P-38.



FOWLER FLAPS

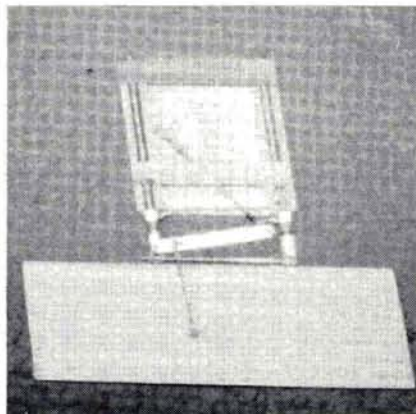
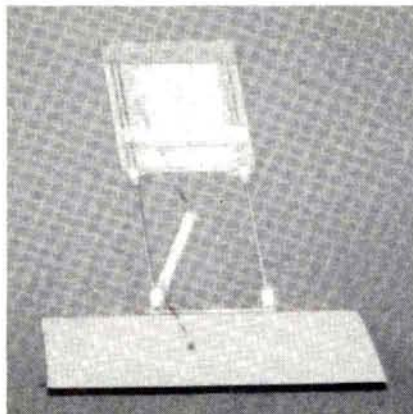
The plans show the flap unit with the flap retracted and with the flap extended. For clarity, the bottom panel has been removed and the view is of the underside of the wing. Note that the 10-degree forward sweep of the wing's trailing edge requires that there be two right-wing flap units and two left-wing units (the plan shows a left-wing unit). Right-wing units require a reversal of the forward sweep and linkage.

CONSTRUCTION

Bimba* or Clippard* air cylinders and fittings are available through various distributors listed in the "Yellow Pages" under "cylinders-air & hydraulic." I use Bimba 0074 cylinders for 1/5-scale and Bimba 0073 for 1/6-scale in my P-38 designs. I recommend the Clippard RC-0581 clevis for both versions because it's smaller than the Bimba unit. All other parts for the Fowler flap units are available at a hobby shop near you.

Begin by preparing two identically sized pieces of 1/32-inch-thick ply with an angle of 10 degrees at the forward and aft ends. (The 10-degree angle will match the trailing-edge sweep of the P-38 after the unit has been installed.) As shown on the plans, these pieces will form the top and bottom walls of the removable module that contains the retract mechanics.

Select one piece to work on and put the other aside (you'll use it as a cover for the finished



The flap unit is shown deployed (above left) and retracted (above right).

unit). The size of the ply work piece will depend on the model you're building; in turn, its size will dictate the size of all spruce rails. Use CA throughout. Cut and fit the spruce rails along the outer edge of the ply floor.

Attach a Clippard hose fitting to the ends of both Bimba air cylinders. Be sure to use the gasket provided. Thread the 10-32 nut and Clippard clevis over the piston rod (inner shaft) at the other end of each cylinder. With the cylinders retracted, turn the nut and clevis all the way down to the barrel of the cylinder. Check to see that 4 inches of piston-rod extension are available. Lock the nut and the clevis together so that they don't turn on the piston.

Lay each cylinder in place with its air-vent hole facing upward. Apply CA to two or three

places along the crevice formed by the cylinder and the spruce rail. Don't obstruct the air vents. You must drill a 7/32-inch hole into the side of one of the inner rails (see plan). Mount the butt end of a Du-Bro* ball post in this hole with CA. Cut out and fit all other spruce pieces into place.

Make a crossbar according to the dimensions shown on the plans. Mount the crossbar and a Du-Bro nylon hinge to the appropriate cylinder clevis using a steel rivet. Use a small washer at each end of the rivet as a spacer. The washer should be mounted between the rivet head and clevis at one end of the rivet, and between the crossbar and rivet burring at the other end.

Fasten a Du-Bro nylon hinge to the other cylinder in a similar manner, but omit a crossbar connection. Place the brass tube (or piano wire)

hinge axle through the nylon hinges, with the Du-Bro collars mounted in the hinges as shown in the plan (4-40 bolts will later anchor the flap to these collars).

In the retracted mode, the flap-hinge axle forms the proper 10-degree sweep angle for the flap. Later, before you mount the flaps on the retract mechanism, coat the clevis cavity with CA so that the hinge can't pivot sideways.

Make a restraining rod out of a threaded 2-56 rod that has a steel Kwik Link* at one end and a nylon socket at the other end. The ball link that you mounted on the retract assembly side rail will fit into the socket. Make a 10-degree bend in the rod at the nylon connection before the Kwik Link is connected to the crossbar. You may cover

FOWLER FLAP OPERATION

The unit's two 5/16-inch-bore air cylinders have stroke lengths that accommodate the flap chord involved. The cylinders are connected to the flap hinge and provide suspension for the flap. A crossbar is attached to the piston of one of the cylinders. The other end of the crossbar is connected by way of a Kwik Link to a restraining rod that extends diagonally across the frame and is anchored to a ball socket. A flap drag link connects the crossbar to the flap aft of the hinge line. As air extends the pistons aft, one end of the crossbar also moves aft. This action causes the crossbar and the restraining link to be extended, changing the angle of the crossbar. The flap drag link is somewhat restricted in its travel, causing the flap to rotate downward across the hinge line. The flap has been extended aft the required 4 inches and progressively angled downward the required 40 degrees. The air cylinders are the spring-return type, so removal of the air supply causes the flaps to return to the retracted position. I use B&D Enterprises' flow-control valve because of the rapid air exhaust when the control is moved to the flap-up position. Only two of the operation ports are used. A short piece of air line runs between the unused ports.

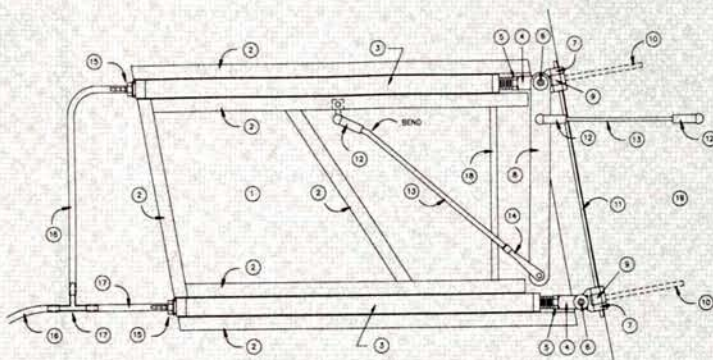
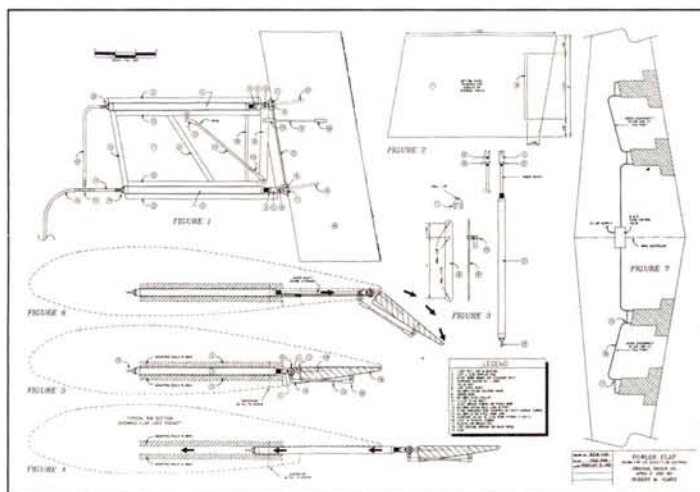


Figure 2

1. 1/32-inch ply, top and bottom
2. 1/4x3/8-inch spruce rail
3. 5/16-inch-bore Bimba air cylinder, no. 0074
4. Clippard clevis, no. 0581
5. 10-32 nut
6. 1/8-inch steel rivet
7. Du-Bro nylon aileron hinge
8. Crossbar
9. Du-Bro 3/32 collar
10. 1 1/2-inch 4-40 bolt
11. 3/32-inch brass tube hinge axle (or piano wire)
12. Du-Bro nylon ball link and post
13. 2-56 threaded rod covered with heat-shrink tubing
14. Du-Bro 2-56 steel Kwik Link
15. Clippard 10-32 to 1/16-inch hose fitting, no. 11752-2
16. 1/16-inch-i.d. plastic tubing
17. Plastic or brass tee fitting
18. 1/8-inch square spruce or bass wood
19. Flap



Order the full-size plans (page 114).

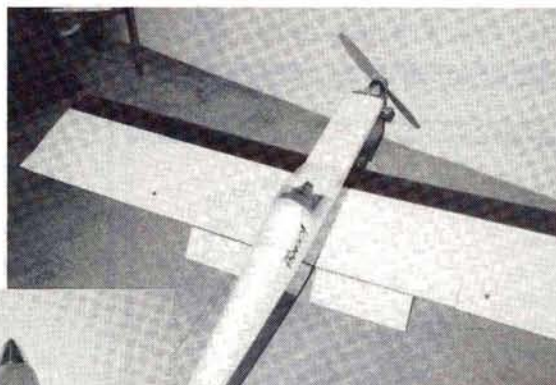
the threaded area of the restraining rod with heat-shrink tubing.

Adjust the Kwik Link so that the crossbar is at a 90-degree angle to the cylinders, i.e., directly across the aft edge of the retract assembly (see plan). Screw a 1 1/2-inch 4-40 bolt into each of the 3/32-inch collars. Clip off the heads of the bolts when you're ready to fasten the flap into place.

Wing construction should provide for a flap-unit pocket (the plans show wing-mount rails into which the flap mechanism slides) and a flap cavity. The flap cavity should have a floor (assuming you're looking at an up-side-down wing) upon which the rivet heads can slide freely through-out extension. As indicated in Figure 6 on the plan, the rivets support the flap mechanism when air loads

the wing's trailing edge (not the cylinders).

Once you've fitted the flap into place, manually extend it by pulling it at the brass hinge line. When free operation is assured, you may apply epoxy to lock the bolts into the flap. Make a flap drag link of a 2-56 threaded rod with nylon sockets at each end. You may cover the threaded area with heat-shrink tubing. Snap one end of the drag link onto the ball post on the crossbar. Snap a ball post into the nylon socket at the other



The prototype flap mechanism was tested on an Ace Bingo. Countless trouble-free extensions and retractions have proven the design's reliability.



Here, Fowler flaps are deployed on the 1/8-scale P-38 sold by Yellow Aircraft* of Lexington, MA.

are in effect. The round rivet heads also facilitate retraction by sliding cleanly under load.

Fit the flap retract unit (not the flap itself) into the wing pocket, and position the 4-40 bolts parallel to the flap floor. The position of these bolts at the collar dictates the locations of the holes in the leading edge of the flap that will accept the bolts. When installed in the flap, the bolts must be positioned at a 90-degree angle to

end. With the flap retracted, position the ball post on the flap, and mark the center. I suggest that you fasten the ball post to a 1-inch-square piece of 1/16-inch plywood and that you prepare an insert in the flap surface for mounting the ply and ball post.

On the plan, note the screw center line that has been drawn through the bottom spruce rails of the wing into the outer spruce rails of the flap unit (see "Center line of no. 20 screw"). Two screws are used, one on each side. Sheet-metal screws will firmly anchor the flap unit in the wing. Thus, the unit can easily be installed or removed from the wing. Be sure that you attach a quick-disconnect plug to the air line at the plug-in

(Continued on page 102)

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AIRWAVES

(Continued from page 97)

band variety. It's true that the marketplace is dominated by R/C, and there are very few simple, inexpensive models available for novices.

As far as Ukie supplies go, you might want to check out the latest Sig Mfg. catalogue. They have a large inventory of small, solid-rubber wheels, control handles, stainless-steel braided wire, tanks, Ukie bellcranks, etc.

Given today's economy, it is difficult for many hobby shops to keep low cost, low-turn-over items on the shelves. You might be able to find a lot of these kits in local five-and-dime variety stores. Believe it or not, I still have an old Top Flight Ringmaster and a Duke Fox fuel-blackened Enya .19 in my old shoebox carryall in the basement—looks pretty good after all these years, too! GY

(Continued on page 122)

FOWLER FLAPS

(Continued from page 101)

wing separation point.

The total cost per unit is about \$40 for a 1/5-scale plane and a little less for a 1/6-scale. If you have any questions regarding adaptation of this flap design to different scales or types of aircraft, please feel free to contact me at Apt. 1525, 12660 Jupiter Rd., Dallas, TX 75238; (214) 348-5193.

*Here are the addresses of the companies mentioned in this article:

Robert Mfg., P.O. Box 1247, 310 N. 5th St., St. Charles, IL 60174.

Ace R/C, 116 W. 19th St., Box 511C, Higginsville, MO 64037.

Bimba Mfg. Co., P.O. Box 68, Monee, IL 60449; (708) 534-8544.

Clippard Instruments Laboratory, 7390 Colerain Rd., Cincinnati, OH 45239; (513) 521-4261.

Du-Bro Products, 480 Bonner Rd., Wauconda, IL 60084.

Kwik Link; distributed by Du-Bro Products.

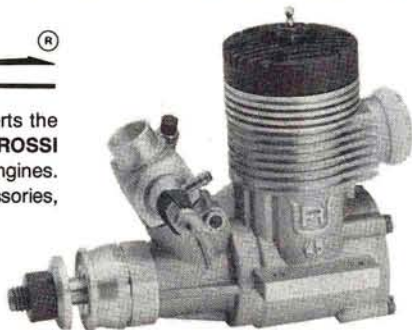
B&D Enterprises, Route 81, Box 7, Ballard, WV 24918.

CBA Models, 1620 N. Leavitt Rd. NW, Warren, OH 44485.

Yellow Aircraft, 203 Massachusetts Ave., Lexington, MA 02173.

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HOW TO

by RICHARD MUISE

IN THIS AND the next two issues, Richard Muise of Motion Graphics* will show you how to create an awesome paint job on the *inside* of a clear, vacu-formed heli canopy. To use these techniques, you must start with a high-quality, clear plastic canopy, such as the one used in this article (provided by Hel-X*).

Richard Muise specializes in painting helicopter canopies, R/C car bodies and fiberglass boat hulls.



PHOTO BY PAUL SCHWARTZ

Miniature Aircraft's* X-Cell 60 sports the finished canopy that's the subject of this article.

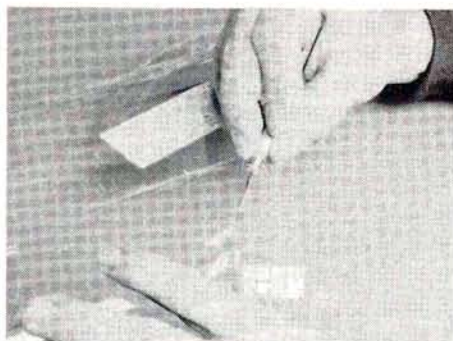
Painting Heli Canopies

Tips from a master

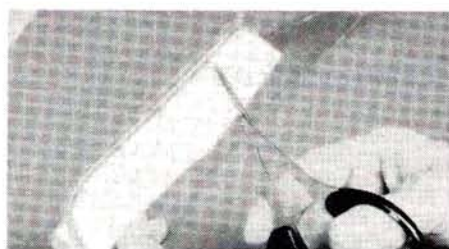
MATERIALS REQUIRED

- | | |
|---|--|
| 1 gallon acrylic lacquer thinner | 1 pack black Coverite Body Shop Pinstripes |
| 2 bottles Candy Blue Pactra* R/C paint | 1 hobby knife |
| 1 bottle White Pactra R/C Paint <i>or</i> | 1 roll 2-inch masking tape |
| 1 can Coverite Body Shop spray paint | 1 fine-point permanent marker |
| 1 bottle Yellow Pactra R/C paint | 1 tack rag |
| 1 bottle Neon Red Pactra R/C paint | 1 quart black acrylic lacquer |
| 1 bottle Neon Orange Pactra R/C paint | 1 quart clear acrylic lacquer |
| 1 bottle Candy Purple Pactra R/C paint | 10 small bulldog clips |
| 1 tube Zap-A-Dap-A-Goo | 1 sheet 220-grit sandpaper |
| 1 touch-up gun | 1 block sander |
| 1 airbrush | |





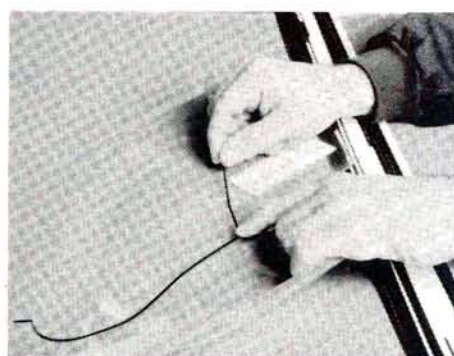
1. Use a hobby knife to score the canopy along trim line that's molded into the canopy halves. Be careful when you do this: a slip of the hobby knife into an area that you don't want removed will create a weak spot that will crack or break later.



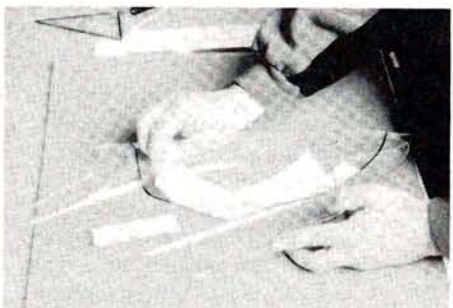
2. In the area of the canopy that you want to remove, cut to the scored line every 1 to 1½ inches. Now, fold the tabs away from the scored line, and the pieces will break off where you scored them. (You may have to fold them back and forth a few times before they break off.) Use your hobby knife to trim off any rough spots and smooth the cut edge.

Alternate method: use Kyosho or Tamiya Lexan-trimming scissors (you can find them at hobbyshops). If you do this, you might want to sand the edges after you've finished trimming them.

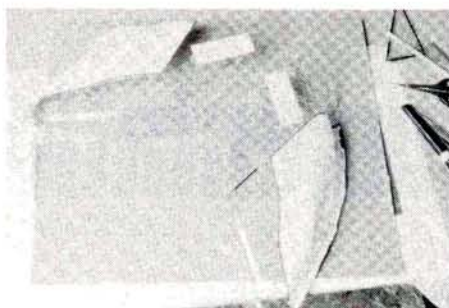
Before you proceed, clean the inside of each canopy half with a solution of water and dishwashing liquid, or wipe them with alcohol. Be sure that the canopy is dry before you resume.



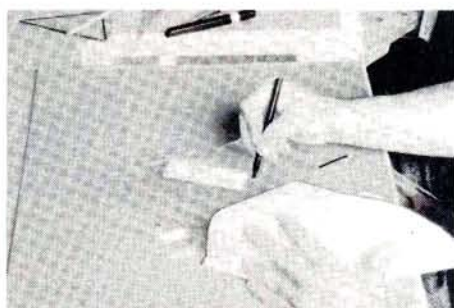
3. Outline the windscreen on both halves of the canopy with 3/32- or 1/16-inch Coverite® black pinstriping tape. If the outline has sharp angles or very tight radius curves, cut the tape and overlap these angles to ensure that the tape stays flat when you paint it.



4. Mask off the windscreen area with masking tape. Be sure that the masking doesn't extend past the black pinstripe line; that would cause a "blank" space in your paint job.



5. This view shows the completed windscreen masking.



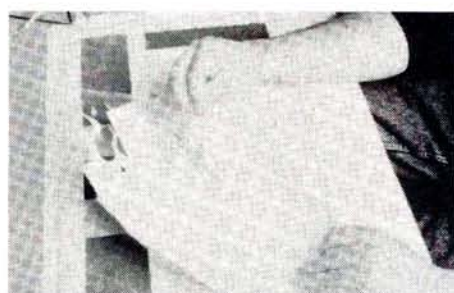
6. Use a fine-point permanent marker to draw the flame pattern on the outside of the canopy. Try to make your flame pattern enhance the contours of the canopy, i.e., air intakes, landing-gear cutouts, etc.



7. Now, on the inside of the canopy halves, lay down 2 inches of masking tape over the flame pattern. Try not to overlap the strips of tape any more than necessary, because you have to cut this tape.



8. Using a hobby knife with a new or very sharp blade, cut out the flame pattern on the masking tape. To do this, you'll need some sort of light source to shine through the canopy. I use a light table.



9. After you've cut the outline of flames, peel the masking off the area toward the rear of the canopy (behind the flames). Be sure to mask the forward part of the canopy so that when you paint the rear there won't be any overspray in the front. Burnish all edges of the masking to prevent paint from running underneath it.

Now, you're ready to paint the canopy! We'll begin in next month's issue.

Here are the addresses of the companies mentioned in this article:

Motion Graphics, 2645 Robert Arthur Rd., Westminster, MD 21158; (410) 848-0008.
Hel-X Corp., 558 Highland Ave., Upper Montclair, NJ

07043; (800) 553-4359.

Miniature Aircraft, 2324 N. Orange Blossom Trail, Orlando, FL 32804.

Coverite, 420 Babylon Rd., Horsham, PA 19044.

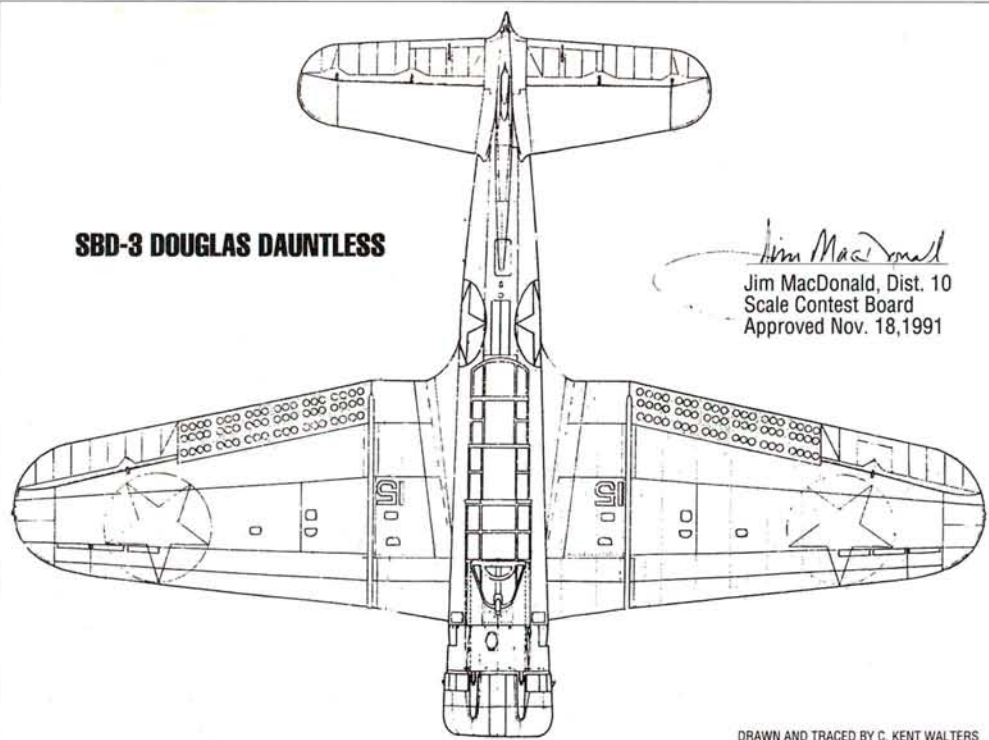
Pactra Inc., 620 Buckbee St., Rockford, IL 61104.

PHOTOS BY YAMIL SUEDE

Problems
and
solutions

SBD-3 DOUGLAS DAUNTLESS

Jim MacDonald
Jim MacDonald, Dist. 10
Scale Contest Board
Approved Nov. 18, 1991



DRAWN AND TRACED BY C. KENT WALTERS

Scale Documentation

by KENT WALTERS

THE STATIC documentation required for AMA scale competition can be troublesome for many, including the most seasoned competitors. Although many articles have been written about where to find valuable information on color/markings as well as outline, it's this last item that will be the primary focus of this article. In the AMA R/C Sport-Scale Sportsman and Expert classes, accuracy to outline garners the most points (40) compared with 30 each for color/

markings and craftsmanship. This accuracy to outline should add interest for serious competitors. Additionally, it has been my experience as a competitor and a judge that this aspect of required documentation can handicap the modeler as well as scale static judges in scale competition.

DETAILED OUTLINE DRAWINGS

All too frequently, published three-view outlines available for aircraft

aren't necessarily faithful or complete depictions of specific subject aircraft. This often becomes apparent during judging, when comparisons are made of the included photo(s) of the aircraft. These photos may conflict with the required three-view outline drawings. When such discrepancies appear, the photo(s) often take priority in judging the aircraft.

Needless to say, such discrepancies can create notable problems and delays in static judging. At worst, it may unjustly compromise a static score by introducing contradictory documentation, even though the modeler faithfully followed the feature outlines found in available photos of the subject aircraft. Another more serious pitfall for the unsuspecting scale builder could be the faithful recreation of the model exclusively from questionable three-views, which may poorly supplement included photo(s). Another alternative may be simply to omit photos in spite of their availability, but that may not produce a very impressive documentation package.

The described three-view problem isn't uncommon at major scale events. At the 1991 Top Gun event, one modeler presented three sets of published three-views (one for each static judge). Each set was recog-

This photo of an early SBD-3 Dauntless clearly shows the gun-stowage doors directly above the fuselage's U.S. Star insignia. The earlier SBD-2's had only a single .30-caliber gun in the rear, while this SBD-3 had field-installed twin .30s. This SBD-3 wasn't equipped, as were later models, with sliding panels under the upper folding doors for the larger gun.



SBD-3 DOUGLAS DAUNTLESS



Jim MacDonald
Jim MacDonald, Dist. 10
Scale Contest Board
Approved Nov. 18, 1991

DRAWN AND TRACED BY C. KENT WALTERS

These previously unpublished illustrations were reviewed and approved on November 18, 1991, by Jim MacDonald, the director of the District 10 Scale Contest Board, and they're legal for use as scale documentation. Note that the drawings were drawn and traced by Kent Walters.

(Annotations have been removed from originals.)

nized as being different in outline from the others, and each represented the subject aircraft!

Sources of three-views are indeed varied. Many three-views originate in various magazines or books and are drawn by different artists or draftsmen. They can also include factory drawings, or other documentary sources. None of these may illustrate a particular aircraft variant with the detail and accuracy now frequently required at scale competition events, including the aforementioned factory drawings! Many such drawings were often simply "renditions" of the aircraft by the manufacturer and weren't intended to duplicate the aircraft or specific features to the level of accuracy now often seen in scale competition.

The message in all of this is for the scale competitor to beware. It would be wise to compare your outline drawings and photo(s) closely. Certainly, such published three-view (or more) outline drawings are legal to use, but again, that doesn't ensure their accuracy or value in scoring when used with actual photo(s).

RESEARCH YOUR OWN

So, now you've studied your documentation, and you see problems.

There's a worthwhile alternative for diligent modelers who wish to pursue the matter further. They can use what I describe as "defending photos" to prove accuracy beyond that of existing outline drawings. For many years, the AMA has made provisions for the use of previously unpublished scale outline drawings at contests, if they've been reviewed

SCALE DOCUMENTATION SOURCES

The "Scale Data Source List" provides the scale modeler with a range of scale-documentation sources that include museums, government agencies, full-scale and model-aviation organizations, book dealers, aviation periodicals, plans vendors, and sources of photos, three-view drawings and plans. A copy of this list, which was prepared by Claude McCullough, is available to anyone who joins the National Association of Scale Aeromodelers. The annual membership fee is \$8. Members will also receive "The Replica," a bi-monthly scale newsletter. To join this organization, contact Bert Dugan, Secretary/Treasurer, NASA, 11090 Phyllis Dr., Clio, MI 48420.

and approved by a member of the AMA Scale Contest Board or some other *recognized* authority (see the AMA rule book). Such approval of a new or revised outline drawing is obtainable if the evidence of photos indeed *defends* those corrections or variants identified by the scale modeler in the new drawing. This review and approval process can complement prior published documentation. The product of this effort can benefit both the scale modeler and other aviation enthusiasts if the approved, new outline drawings are made available thereafter. Since these drawings would also generally carry the author's name as well as the reviewing AMA contest board member's name, they would serve as a further long-lasting reference. They provide recognition of both the originator and the AMA review process. This is most definitely a "win, win, win" situation for the modeler, the AMA and other aviation enthusiasts as well.

Perhaps this will be an opportunity for some of the truly "studied experts," who have developed their expertise based on scale modeling of specific aircraft, to make a further contribution beyond that of a comparatively short-lived fragile model.

The message in all of this is for the scale competitor to beware.

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AIRWAVES

(Continued from page 102)

STAFFORD'S STUFF

I recently purchased a Jack Stafford Aircoupe scale trainer. I've been to several Toledo shows and a couple of AMA events, but I've yet to see one of these models on display. I wonder why? I've never seen any articles in *Model Airplane News* about this plane. Again, I wonder why? Have you ever published any articles and, if so, how can I get copies of the article? If none has ever been published, would you consider doing an article on this plane?

W. D. GIBSON
Greenwood, IN

W.D., a look in our files shows we haven't done a "Field and Bench Review" on the Stafford Aircoupe in the last 10 years. It's interesting to note that Jack Stafford Models' inventory of kits and tooling was taken over by Mutchler's Hobbies Inc., just about 10 years ago. In the past, we've occasionally reviewed a product a second time if it was reissued with revisions or manufactured again. These second-look articles are our way of giving attention to those older kits that were truly great. Just because it isn't a new kit doesn't mean it isn't a great kit! We'll consider your suggestion, and perhaps we'll feature a Stafford story in the future.

For those unfamiliar with this line, they were recognized as some of the best scale models around. Mutchler's Hobbies offers several, including a 90-inch wingspan B-24, the Aircoupe, a twin-.40 powered Comanche, a 50-inch EAA Acro Sport biplane for .60 engines and the .25-sized P-51 Mini-Mustang Quarter Midget pylon racer. For more information, contact Mutchler's Hobbies, Inc., 4620 Crandall, Laneville Rd, Corydon, IN 47112; (812) 366-3141. GY

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BISHOP'S R/C SWAPMEET—Carrollton, GA. First Saturday of each month (cancelled in July) from 8 a.m. to 4 p.m. at VFW Post 7404. Admission, \$2 each; table fee, \$10 each (170 tables, reservations available). For more info and reservations, call (404) 836-1310 or mail check to: Raymond L. Bishop Sr., 270 Castlegate Cir., Carrollton, GA 30117.

FOR SALE: collector's engine; Magnum Himax 4-stroke 120. Bench run. Box, papers and tools, \$300. Jack Bielecki, 911 Ranchview Cir. NW, Calgary, Alberta, Canada T3G 1A4; (403) 239-6181.

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CLUB OF THE MONTH



**KANSAS CITY
RADIO CONTROL CLUB**
C/O FRED WEDDLE, 410 N. PLEASANT
INDEPENDENCE, MO 64050

If an R/C club is active and successful, it's important that it give something back to its community. The Kansas City Radio Control Club seems to understand this. Its newsletter, "Contacts," reports on the many facets of the club's continuing involvement in making the community aware of what it stands for and helping the hobby grow.

Among the things we found interesting in "Contacts" were Ed Baucom's "President's Propwash" column, which extolled the virtues of volunteering; Fred Hulen's helpful dissertation on CA; and Doris McKee's essay about the winter flying trip she, her husband and their dog Daisy took to Florida this winter.

On another front, "Contacts" featured a letter from Bill Capehart, a modeler from LaCygne, KS, who wanted to inform the club's members of a recent success. He got a high-school shop teacher so "hooked" on R/C that when school resumed, the teacher had his students build their own R/C trainer! Bill volunteered to teach each student how to fly. It's interesting that next year's class has already signed up; the kids love it! Bill said in his letter, and we have to agree, that we really miss the boat when we don't get the kids involved.

Two things that you must have to improve your club's image are programs that involve the community and volunteers to get them involved. It only takes a couple of hours each month, but the benefits are immeasurable. For their spirit and enthusiasm, we award two, one-year subscriptions to our newest "Club of the Month," the Kansas City Radio Control Club. ■

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CAN YOU IDENTIFY THIS AIRCRAFT?

If so, send your answer to *Model Airplane News*, **Name That Plane Contest** (state issue in which plane appeared), 251 Danbury Rd., Wilton, CT 06897.

Congratulations to Cadet C. Todd Owens of the United States Air Force Academy for correctly identifying April's mystery plane. The plane is a Fokker F. XXII, and it had a gross weight of 28,600 pounds. It was capable of carrying a payload of 4,800 pounds, had a wing-



span of 98.4 feet, was 67 feet long and had a cruise speed of 140mph. It was powered by four 500hp Pratt & Whitney engines.



Christened the "Lapland," the F. XXII shown belonged to the Swedish Aerotransport (Stockholm), of which Captain Florman was the head. On June 9, 1936, the Lapland crashed during takeoff from Bulltofta Airport in Malmö, Sweden.

The winner will be drawn four weeks following publication from correct answers received (on a postcard delivered by U.S. Mail), and will receive a free one-year subscription to *Model Airplane News*. If already a subscriber, the winner will receive a free one-year extension of his subscription.

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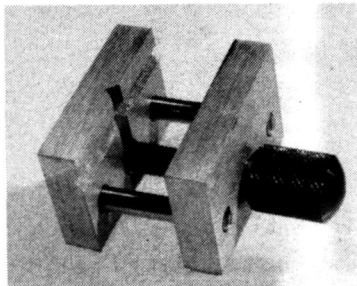
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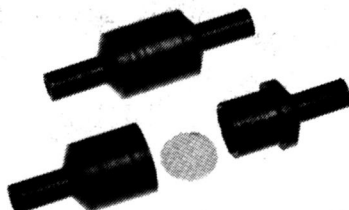


BRANDY TOOLS Mini Vise

The Mini Vise's $\frac{5}{16} \times 1 \times 1\frac{1}{2}$ -inch brass jaws hold small parts firmly, but gently, and they can open to $\frac{9}{16}$ inch. The clamping screw has a large knurled head that's easy to grasp and turn. The screw is attached to the fixed jaw by a retaining ring, and it can be taken completely apart. Send a 4x9-inch SASE for a free Spring/Summer 1992 Tool Catalog.

Price: \$16.95 (plus \$2.50 S&H)

Brandy Tools, c/o Armando Cimino, 41 Fenley St., Revere, MA 02151.



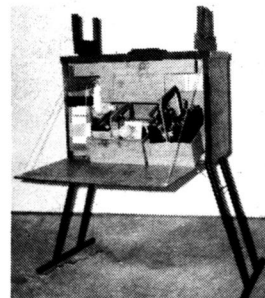
WINDSOR PROPELLER CO. Master Airscrew Fuel Filter

Fuel filters can dramatically extend engine life, and now there's an economical, disposable filter to replace Windsor's all-aluminum one. The new design features an ultra-fine, 125-mesh stainless-steel screen, and it has a permanent seal. Made of fuelproof plastic, it accepts fuel tubes with diameters ranging from 0.075 inch to 0.093 inch, and 2mm, which is commonly used with .15 to .90 engines. Send an SASE for a free catalogue.

Part no. MA4500N

Price: \$1.69/pack of three

Windsor Propeller Co., 3219 Monier Cir., Rancho Cordova, CA 95742; (916) 631-8385.

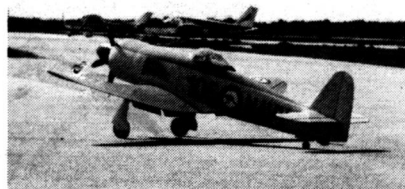


THE FLIERS MATE Custom Cases

Made of select oak hardwoods and oak plywood and finished with a walnut stain and tough polyurethane, Custom Cases will accommodate models of up to $\frac{1}{3}$ scale in their foam-padded adjustable fuselage holders (wing holders on the back). They'll also hold a 1-gallon fuel can, and they have removable flight trays and double transmitter trays. There's a long drawer for larger props and a smaller one for tools, etc. Dimensions: 25x10x16 $\frac{1}{4}$ inches (with legs that fold).

Price: \$125 (plus \$8 S&H)

Custom Cases, P.O. Box 265, Camden, AK 91701; (501) 836-6594.

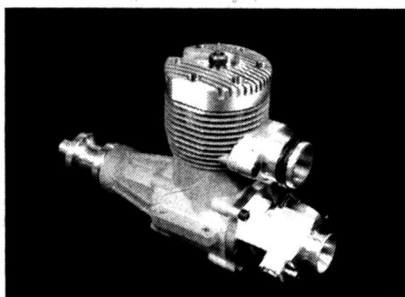


DAVE'S CUSTOM MODELS Hawker Sea Fury

This new Hawker Sea Fury MK11 Deluxe kit features an epoxy/glass fuselage with molded-in fin, sheeted outer wing panels and installed leading edges. All the parts are of wood (no plastic), which is hand-cut and shaped. The kit comes with a beautiful cowl with panel lines, a canopy and an aluminum $\frac{5}{8}$ -inch spinner, instructions, three-views for scale documentation and close-up photos of the full-scale Sea Fury. Specifications: weight—24 to 28 pounds; radio required—6-channel; wingspan—86 inches; wing area—1,600 square inches; engine—4hp to 6hp, e.g., Sachs, Quadra, or Zenoah.

Price: \$375 (plus S&H)

Dave's Custom Models, 27B Spring Circle Dr., Austin, TX 78736; (512) 288-2055.



BOB VIOLETT MODELS BVM .81 Ducted-Fan Engine

The BVM .81 has been upgraded with a new integral backplate/carburetor body and drum-rotor design. A new combustion chamber improves throttle response and allows the engine to run more coolly. Improvements in piston, connecting rod and crankshaft designs allow this already proven engine to run more smoothly and last longer. Front spool adapters and hardware are available to fit the Dynamax fan unit. Quiet exhaust systems are also available. Send \$4 for the BVM Jet Information Pack.

Price: \$410

Bob Violett Models, 1373 Citrus Rd., Winter Springs, FL 32708; (407) 365-5869.



WENDELL HOSTETLER'S PLANS Cessna 150/152

Hostetler's latest offering is a three-in-one plan that features the Cessna 150/152 or the Aerobat. The model has a traditional balsa, plywood and basswood box construction, and available accessories include: cowl, nose gear, main dural landing gear, custom kits and 60-inch Edo-type float plans. The 30-percent-scale plans are drawn on two 42x96-inch sheets and include a three-view that shows the 150 and the 152. Specifications: span—120 inches; length—86.7 inches; weight—24 to 26 pounds; power—2hp to 4hp.

Price: \$29.50 (plus \$3.50 S&H)

Wendell Hostetler's Plans, 1041 Heatherwood Lane, Orrville, Ohio 44667; (216) 682-8896.

PRODUCT NEWS



FLORIO FLYER CORP. Yankee Twister

The Yankee Twister is an ultra-high-performance, competition, fun-fly model that can be built quickly, is extremely rugged and offers awesome aerobatics capabilities. Constructed mostly of balsa, it has a carbon-fiber tail boom and carbon-reinforced wing spars, maple engine rails, conventional music-wire landing gear (with two wheels) and a highly effective vee-tail.

Specifications: wingspan—48¹/₄ inches; wing area—852 square inches; weight—3 to 3³/₄ pounds; engine size—.25 to .35ci; radio channels required—3.

Price: \$99.95

Florio Flyer Corp., P.O. Box 88, 149 Scotland St., Dagus Mines, PA 15831; (814) 834-2586.



PETAL MFG.

Saber 6 Transmitter Tray

This affordable Saber 6 transmitter tray was designed for airplanes and helicopters. It will hold all the popular transmitters that have a handle (JR, Futaba, Airtronics, Hitec, etc.). Made of GE Lexan, the Saber 6 isn't affected by model fuel. It's unbreakable under normal use and weighs only 10 ounces. With fully adjustable height and tilt, the Saber 6 comes completely assembled so it's ready to use in seconds. All the transmitter controls are easily accessible. Petal Mfg. promises full dealer support.

Price: \$19.95

Petal Mfg., 58 Spencer Rd., Basking Ridge, NJ 07920; (908) 766-7095.



J'TEC Pitts-Style Mufflers

J'Tec now offers two light, aluminum, brightly polished, bolt-on Pitts-style mufflers for side-mounted engines. They'll fit most .29 to .61 engines made after 1989.

Part nos. JT-40PB (.29 to .45); JT-60PB (.51 to .61).

Prices: \$22.95; \$24.95 (\$2.50 S&H).

J'Tec, 164 School St., Daly City, CA 94014; (415) 756-3400.



AIR SCALE, UK Dawn Patrol

Air Scale, UK introduces four limited-edition, exactly 1/16-scale, classic WW I fighter kits in its new Dawn Patrol series: Fokker D7, Nieuport 17.c, Pfalz D3/D3a and Pfalz Dr. 1 triplane. For expert builders or newcomers, these accurate models include highly detailed rolled plans, a 20-page instruction book, machine-cut plywood formers and balsa ribs, bent strut and landing-gear wire, spun cowl or spinner, hinges and closed-loop, cable-actuated control surfaces. The spars are of spruce and basswood. Only 1,000 of each will be offered.

Prices: £95 (Fokker D7, Nieuport 17.c, Pfalz D3/D3); £75 (Pfalz Dr. 1 triplane), including surface shipping; add 15 percent for airmail (check or an international money order).

Air Scale, UK, 46 Grandtully Dr., Kelvindale, Glasgow, G12 ODS, Scotland, UK.



GLOBAL HOBBY Thunderbolt Glow Plug

After two years of research, development and thorough testing, here's Thunderbolt's newest glow plug—the Thunderbolt no. 3, which is for all kinds of model engine. The no. 3 is better because it develops a hotter glow that sustains more reliable combustion over a wider range of needle-valve settings, especially at idle and up through mid-range.

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Global Hobby Distributors, 10725 Ellis Ave., Ste. E, Fountain Valley, CA 92728-8610; (714) 962-0133; fax (714) 962-6452.



JMD MODELS Swift

JMD's 1/4-scale Swift has flaps and retracts. The kit includes a fiberglass fuselage, a cowl (globe or Willys), a vacuum-formed canopy, foam-core wing and tail surfaces (all foam is cut for retracts and servos) and full-size plans. Specifications: wingspan—92 inches; weight—17 pounds; recommended engines—G .38, Q .40, Super Tigre 2500 or 3000.

Price: \$319.95

JMD Models, 2667 Columbia Rd., Medina, OH 44256; (216) 483-3794.

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